Only B. F. Goodrich makes the grommet belts that cut costs 20 to 50%!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

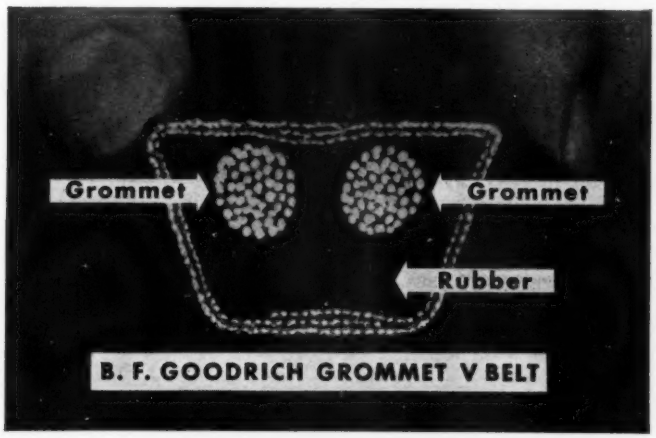
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. PE-7
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

LIFTS HERE, THERE . . . EVERYWHERE

Light weight, ruggedness, speed make the portable 'Budgit' Aluminum Chain Block tops for every imaginable spot-lifting job. It's a one-man hoist — easy to carry, hang up, and use anywhere. The ¼-ton size weighs a mere 29 lbs. — a pull of only 25 lbs. on the hand chain lifts the full load!

For on-the-spot hoisting service unmatched by any other chain block — choose 'Budgit.' For design, engineering and construction features backed by over 60 years' experience in building load-handling equipment exclusively — 'Budgit' is the chain block to buy. It's available in ¼, ½, 1, and 2-ton capacities. Bulletin 398 gives full details about this powerful chain block. Write for a copy.

'BUDGIT' I-BEAM TROLLEYS . . . enable your chain blocks to travel the load as well as lift it. Made of tough steel. Adjustable to fit various I-Beam sizes. Ball bearing equipped. Capacities: 500 to 4,000 lbs. Prices from $13.50. Write for Bulletin No. 390.

'Budgit' ®
CHAIN BLOCKS
MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments.

'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineer Club Activities

Philadelphia: At the June 6th meeting of the Greater Philadelphia Plant Engineers Club, new officers were elected to take over duties for the coming year. **Robert F. McCaw,** RCA-Victor Division, was elected president; **C. E. Stiner,** Rohm & Haas Co., was elected vice-president; **James MacDonald,** General Electric Co., was elected secretary-treasurer; and **Haliburt Redding,** Rohm & Haas Co., is the new board member.

A very interesting talk on "Preventive Maintenance" was given by Member James Flanagan of S. F. Whitman & Son, Philadelphia, at this meeting.

New York: At the May 20th meeting of the Plant Engineers Association of New York, the last business meeting until next fall, the following officers were elected for the 1952-53 season: **Lester B. Woolfenden,** General Aniline and Film Corp., is the new president, and **Harold Travis,** Ruppert Brewery, is the new secretary-treasurer.

A talk by W. Floreth, of York Corp., covered the latest developments in refrigeration, with a discussion of the reciprocating, centrifugal and rotary types of compression.

At Your Service

COMPLETE FACILITIES are available to industry for analyzing and solving a wide range of problems relating to metallury, chemistry, chemical engineering, mechanical engineering, and testing and inspection at Sam Tour & Co., Inc., 44 Trinity Place, New York, N. Y.

This firm, having many years of technical consulting experience, is equipped to undertake both continuing and short-term projects involving specialized and routine testing, product and process development, and research on all types of ferrous and non-ferrous, organic and inorganic materials.

The company has pioneered in studies of corrosion problems, has developed techniques of drawing aluminum, machining beryllium, spraying molten metals, and has compounded special alloys. It has had, moreover, extensive experience in applying non-destructive testing methods to the many problems which face industry every day.

Defense Contract Booklets

LOCATE THE tough jobs and then go after them, is the advice of the U. S. Chamber of Commerce to would-be subcontractors seeking defense production orders.

A 36-page booklet, "Subcontracting for Defense," makes it plain that the manufacturer who is on his toes is the one who gets production orders. This booklet indicates sources to which manufacturers may look to obtain leads, and suggests ways of looking ahead for subcontract opportunities that will develop as the defense program goes forward.

Another booklet, "Defense Contract Pricing," was prepared to help

(Continued on page 6)

Chicago Plant Engineers Club Visits International Harvester

Members of the Plant Engineers Society of Chicago combine a plant tour of the West Pullman Works of International Harvester Co. with their monthly meeting

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

User Explains How Armstrong Unit Trapping Boosted Output:

Need for Investment in New Steam Equipment Eliminated by Only $550.00 in Steam Traps

THIS is a story about greatly increased efficiency in a laundry, but the principles involved apply to any plant using steam heated equipment.

In speaking of the benefits derived from Armstrong Unit Trapping, Earl Fast of Soft Water Laundry and Cleaners, Long Beach, California, said, *"It's like a man with dirty eyeglasses—he thinks he's seeing perfectly until he cleans the glasses and finds out what he has missed."*

Mr. Fast's plant modernized its entire return system in 24 hours, installing 71 Armstrong traps costing about $550, with these results:

1. Capacity of machines costing as much as $15,000 per unit increased to the extent that new machines are not now required.
2. Higher quality of ironing and finishing, with touch-up on shirts eliminated.
3. Worthwhile fuel savings.

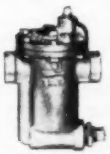
"Our boiler was turning out plenty of steam," continued Mr. Fast, *"but we weren't getting the benefit of it. The best power plant in the world is of no value if you don't use its produced steam to maximum efficiency."*

And there lies the case for Armstrong Unit Trapping, which discharges air and condensate as fast as it accumulates to keep steam heated equipment hot and producing at a peak rate. Your local Armstrong Representative will be glad to survey your condensate drainage system without obligation. Call him or write:

ARMSTRONG MACHINE WORKS

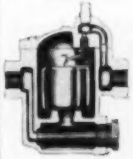
912 Maple Street • Three Rivers, Michigan

Traps with Built-in Strainers Cut Costs



Because the piping at Soft Water Laundry was old, the smallest-sized traps needed protection against dirt and scale. Armstrong No. 880 and 881 traps with built-in strainers were the logical answer because:

1. They cost less than a separate trap plus a strainer.
2. They eliminate external fittings and considerable installation labor.



Left—Cut-away view showing strainer screen at trap inlet. Strainer can be cleaned without removing or shutting off steam.

You always get more out of equipment when you use Armstrong "Unit Trapping"

FREE
44-PAGE STEAM TRAP BOOK
Gives Complete Information
MAIL TODAY!

FILL IN AND CLIP TO YOUR COMPANY LETTERHEAD

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan
Please send me a Steam Trap Book.

Name .....

Title .....

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Defense Contract Booklets

(Continued from page 4)

the increasing number of manufacturers who will be undertaking government defense production. The report proposes improvements in government contracting which have long proved effective in ordinary commercial transactions. The report covers both fixed-price and cost-reimbursement types of government contracts.

The booklets are available from the Chamber of Commerce of the United States, Washington 6, D. C., price of first booklet is 50 cents a copy, second booklet is 25 cents.

Plants Growing and Going Up

Westinghouse Electric Co. plans to build a new plant in Raleigh, North Carolina, for the manufacture of watthour electric meters. They are also building a steam and gas turbine development laboratory at the South Philadelphia Works . . . **Goodyear Tire & Rubber Co.** is expanding its rayon tire fabric production facilities by the construction of a large modern addition to the Clearwater Mills at Cartersville, Georgia . . . **General Electric Co.** is building a new transformer manufacturing plant at Rome, Georgia . . . **Borden Co.** has opened its new chemical plant at Demapolis, Alabama, which will manufacture formaldehyde, synthetic resins and hexamethylenetetramine . . . **Johnson Service Co.** has completed the construction of two new 4-story additions to its East Michigan Street plant in Milwaukee . . . **American Cyanamid Co.** is constructing a new plant near New Orleans, Louisiana, for the production of chemicals from natural gas.

Film on Pallet Loader

THE AVAILABILITY of a 16 mm, 15 min sound movie "The Automatic Pallet Loader," showing how the pallet loaders operate, was recently announced by Lamson Corp.

This movie describes and illustrates the devices which receive cartons from production lines, rotate and space them to form successive layers of the predetermined loading pattern, drop these layers onto pallets, and then deliver the loaded pallets to fork trucks for storage.

Interested groups can arrange to procure the film by writing to J. S. McCullough, Sales Promotion Manager, Lamson Corp., Syracuse, N. Y.

'ROUND ABOUT

Personnel Changes at Roebling

Herbert S. Hunt, Assistant Chief Plant Engineer, recently announced several organization changes in the engineering staffs of John A. Roebling's Sons Company.

Norman C. Dunbar is appointed Divisional Plant Engineer in the Electrical Wire Division, Buckthorn plant, and will be responsible for both plant engineering and maintenance in this division. **William C. Lovelett** is named staff engineer of the Wire Mills (including Copper Mills), replacing Dunbar.

The appointment of Dunbar completed the four divisional posts which were created in July, 1951, when **Carlisle S. Lewis,** was named Divisional Plant Engineer in the Wire Rope Division, **M. Joseph Olafson** in the Cold Rolled Products Division and **William E. Zelley** in Wire Mills and Hot Mills Divisions.

Perfect Foundry Safety Records

PERFECT SAFETY records achieved by four steel castings companies during 1951 and exceptionally low accident frequency ratings for 12 others were recently announced by F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, in a report on steel foundry safety practices.

Heading the list of companies was Hughes Tool Co., Houston, Tex., which completed its fourth successive year of accident-free operation.

The other three steel foundries with unblemished records in 1951 were The Eastern Malleable Iron Co., Wilmington, Del.; Quincy Steel Casting Co., Inc., North Quincy, Mass.; and Weatherly Steel Castings Co., Weatherly, Pa. For the latter two companies, it was the second successive year of operation without a single lost-time accident.

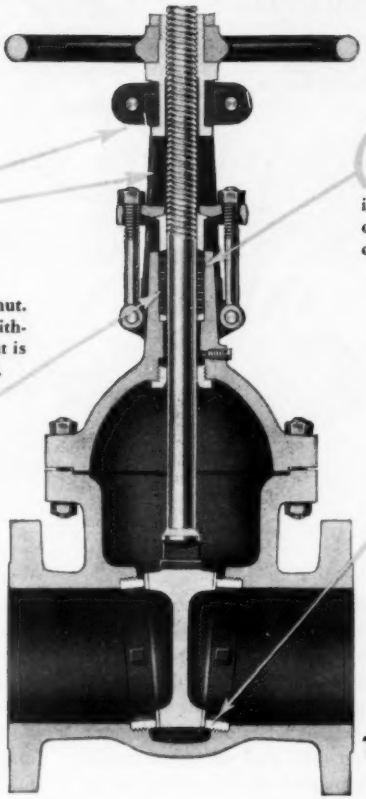
Would You Like to Be an Editor? We Need Another on Our Staff!

THERE IS an opening on Technical Publishing Co's. editorial staff for a young man of around 30 yr of age who has a good personality and common sense and who likes to meet people, travel and write. He does not have to be a gifted author but must be able to write clear and concise English. He should have: an engineering education; and experience in plant maintenance and power engineering. If you qualify and are interested write (strictly confidential) The Editor, PLANT ENGINEERING, 110 South Dearborn Street, Chicago, Illinois.

"BUILT TO THE SAME SPECIFICATION STANDARDS – I THOUGHT ALL STEEL VALVES WERE ALIKE AS TWO PEAS"

OIC BUILDS FROM THAT POINT UP

LOOK AT THESE FOUR FEATURES:



1 2-PIECE YOKE DESIGN

simplifies replacement of yoke nut. Permits replacement of yoke nut without shutting down the line. Yoke nut is OIC Alloy 40; non-galling material.

2 STUFFING BOXES

have greater depth than is specified, permitting the use of 7 to 9 rings of packing, with either wiper rings or condensing chamber below.

3 OIC'S SEAL-EVER PACKING

(exclusive with OIC) lasts 10 to 15 times longer than ordinary packing. It stops pitting and corrosion of stems.

4 SEAT RINGS

are end-seated and are subjected only to compression forces when valve is closed; no loosening of seat rings with repeated opening and closing of the valve. No open spaces to cause turbulence, accumulate dirt and hasten corrosion.

THE BEST STEEL VALVE YOU CAN BUY

This combination involving yoke design, stuffing boxes, packing and seat rings is evidence of OIC's desire to build *beyond* minimum specifications.

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

OIC FOUNDED 1883

VALVES

FORGED AND CAST STEEL · IRON · BRONZE

Don't Bargain-Shop for Service . . .

Bargain shopping for electrical service can be expensive. You'll *lose* . . . if your apparatus isn't repaired properly . . . if the job has to go back to the repair shop. Real savings come only when the work is done right the first time. And this takes special skill—the same kind of engineering know-how that built the original equipment.

You can be *sure* of this craftsmanship at Westinghouse, in its 36 Repair Plants over the country. Each is staffed with experienced workmen who are specialists at rebuilding electrical equipment. They follow standardized procedures on every job. They apply factory-proved techniques and materials. They are backed by exhaustive tests that check out *all* work before the one-year guarantee on rebuilt apparatus is issued. This is the same guarantee carried by new equipment.

Complete service protection, however, calls for more than shop repair. It calls also for precision-built renewal parts, stocked in convenient locations . . . and factory-guided field service to make inspections, adjustments and on-the-spot repairs for equipment that cannot be moved easily.

That's why Westinghouse operates a nationwide network of maintenance services: 36 Repair Plants . . . 31 Renewal Parts Warehouses . . . 46 Field Service Offices.

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

SEE TELEPHONE LISTING ON PAGE 38

Repairs have to be engineered, too!

Combined, these provide a *complete* maintenance service—backed by factory-tested methods, factory-approved materials, factory-trained specialists. They offer the finest in *service protection* . . . the best in *service economy*. Your proof is in the performance of the finished job.

For more information, write today for a free copy of Westinghouse Maintenance booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pa. J-95158

...MATCHED TO YOUR NEEDS

YOU CAN BE **SURE**... IF IT'S

Westinghouse

COMPLETE MAINTENANCE SERVICE

SHOP REPAIR FIELD SERVICE

GENUINE RENEWAL PARTS

IN PLANNING *Your*

CONTINUOUS PROCESSES

INCLUDE

STRAIGHT LINE FLOW Valve Advantages

CASH STANDARD *Streamlined* TYPE 1000 PRESSURE REDUCING VALVES

Streamlined flow of steam, air, oil, etc., around the inner valve is an immediate solution to the important need of dependable control under varying loads.

Continuous processes can be dependably protected against slow downs, failures, and maintenance ordinarily due to valve inefficiencies. The STREAMLINED "1000" Valve with ample capacity, tight closing characteristics, close delivery pressure control, and with a wide range of adjustment makes possible speedier production, smooth operation and no spoilage.

You get straight line flow which eliminates turbulence so that at all times you are easily able to meet peak demand and yet hold the reduced pressure constant at the same time. For the complete facts write for Bulletin "1000."

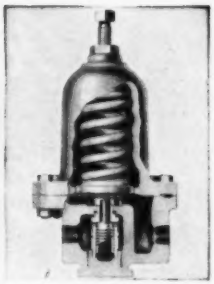
The inner valve fits right in the line as though a part of it

What might be mistaken for a pipe running through the phantom Streamlined Valve above is really the housing which contains the inner valve. Through it you have the Straightline Flow that brings such enthusiastic comments as voiced by many users.

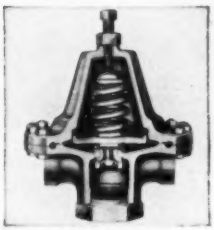
CASH STANDARD CONTROLS.. VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

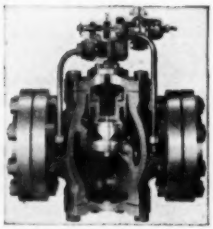
BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES
Send for them



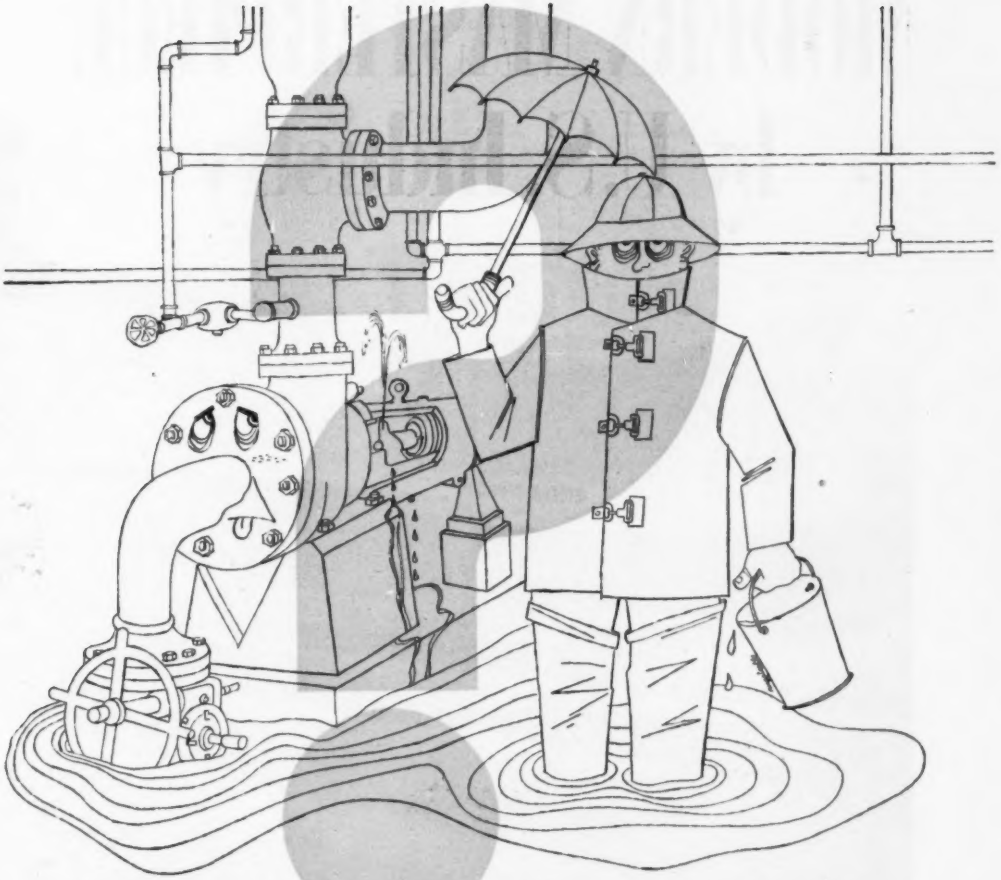
High Pressure Reducing Valve Type H-P; extra heavy for use with initial pressures up to 5000 lbs.; and for reduced pressures up to 650 lbs. Good for most fluids. Sizes: ⅛" to 2"; bronze body; nitralloy trim. Get Bulletin 931.



Type 8871 Pressure Regulator for dirty liquids (like Bunker C fuel oil). Inner valve is bolted to diaphragm for positive movement. Sizes ½" to 10". Bodies: iron, bronze, or steel. Seat ring and inner valve; stainless steel. Bulletin 972.



Cash Standard Type 10 Pressure Regulating Valve, pilot operated. (Pilot operating fluid discharges to outlet pipe; not wasted). Sizes: 2" to 12". Highest pressures: inlet 600 lbs.; reduced 250 lbs. Iron, bronze, or steel bodies standard trims. For water, air, non-corrosive gases and oils. Get interesting Bulletin 966.



*Who needs a mechanical seal?**

If you've got hip boots, a bucket and a standby maintenance crew with nothing to do, why bother with a BJ Mechanical Seal? Take a devil-may-care, every-pump-for-itself attitude and let the packing fall where it may. Or if your maintenance department enjoys a "Quick-save-the-dikes" sort of life, they will have great fun poking in packing before the stuff completely goes.

BUT . . . if your business allows little room for exciting crises and repacking picnics, you should know about the BJ Mechanical Seal. This excellent, precision-made seal – available in a number of engineered types – takes the trouble right out of any stuffingbox. There's no leakage . . . no waste . . . no contamination of pumped liquid . . . no volatile liquid hazard . . . no profit-robbing repacking and delivery-delaying downtime.

Maybe *you* need a BJ Mechanical Seal for your BJ Pump. Ask your local Byron Jackson office for details or write:

Byron Jackson Co.

Since 1872

P. O. Box 2017, Terminal Annex, Los Angeles 54, California

OFFICES IN PRINCIPAL CITIES

**BJ Mechanical Seals are made exclusively for BJ Pumps.*

SEE BJ FOR THE ENGINEERED ANSWER TO YOUR PUMPING PROBLEMS

MODERN MASTERPIECE by U.S. Industry

S.S. United States, New Flagship of American Merchant Marine, Protected by World's Greatest Lubrication Knowledge!

SAILING on her maiden voyage this summer, the 990-ft. S.S. *United States*, largest and fastest liner ever built in America, represents a cross section of U. S. industry . . . a composite of industrial lubrication problems.

Every state contributed to her construction, more than 800 firms supplied materials. Represented are the steel and aluminum industries, metal working, power generation, air conditioning, refrigeration, chemical, textile, plastics, electrical—many others.

Lubrication a Big Problem

The cutaway view shows a small portion of the machinery that powers and operates this world's

Designed by Gibbs & Cox, Inc. Built by Newport News Shipbuilding and Dry Dock Company.

most modern ship. It also indicates why the S.S. *United States* — containing many of the same machines found in plants, mills and mines — presented lubrication problems as complex as any ever encountered in industry.

To solve these problems — to protect giant steam turbines, intricate hydraulic systems, generators, compressors, precision instruments and controls— United States Lines called on Socony-Vacuum.

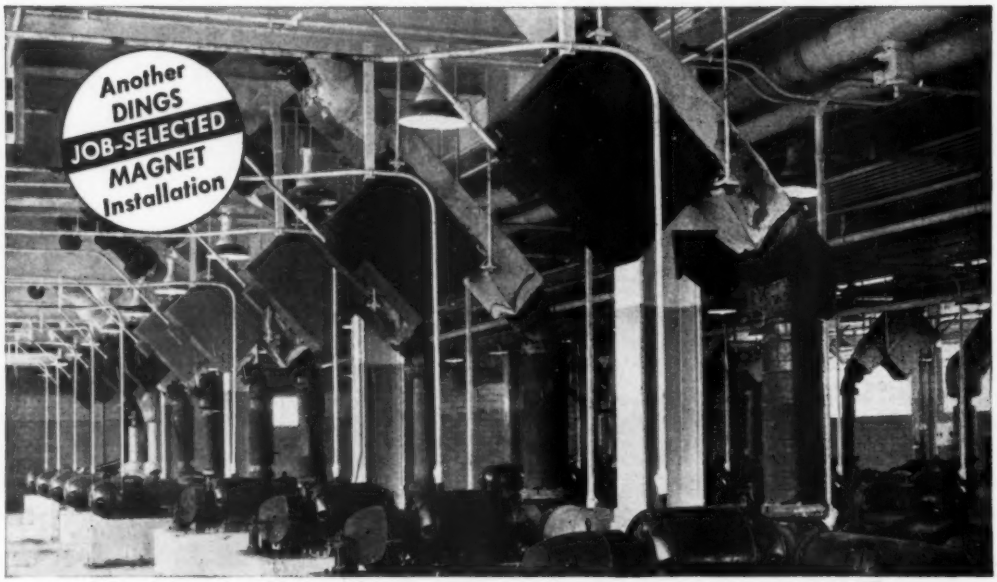
Today, the S.S. *United States* is protected stem to stern by a complete program of Correct Lubrication. This same unsurpassed protection is available to *you*. Why accept anything less?

SOCONY-VACUUM

Socony-Vacuum

Correct Lubrication

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



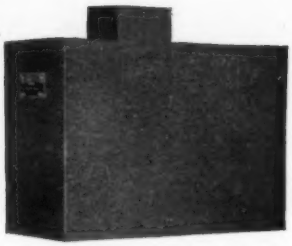
Threat to $33,000 Removed by Dings Magnets

Acetate Plant Gets Surprise;

Unloads 20 lbs. of Iron

A chemical pump has no palate for iron—a single nut or bolt can wreck it. When a large acetate plant installed 30 Dings watertight rectangular electro-magnets—one ahead of each pump—they were protection conscious—said they'd be surprised and satisfied if the whole battery found one or two bolts total. In 4 months, the Dings Magnets extracted over 20 lbs. of tramp iron . . . enough to wreck all thirty pumps . . . $33,000 worth!

This plant achieved its objective to a degree beyond expectations. Three factors were responsible: (1) applying exactly the right magnet for the job; (2) the magnet itself was highly engineered and quality built; and (3) the magnet was correctly installed. Whatever *your* tramp iron problem, those are the things you buy when you buy a Dings "Job Selected" Magnet. Investigate today.



THIS IS THE TYPE THAT DID THE JOB. *The magnet that fit this job best is a Dings Rectangular (electro), a particularly versatile magnet which is effective at distances up to 18". Its triple pole design makes it effective on the most difficult jobs; fast moving conveyor belts, wet, sticky material, etc. Can be adapted in any number of ways to suit particular requirements. Catalog 301-A gives details.*

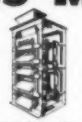
Dings Magnetic Separator Company
4766 W. Electric Ave., Milwaukee 46, Wis.
World's Largest Exclusive Builder of Magnetic Separators

This Catalog Helps You to "Job Select" a Magnet
Is the material you want de-ironed solid . . . semi-solid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-B lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most powerful magnetic separators known. Send for it today.

DINGS MAGNETS

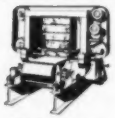
OTHER DINGS MAGNETS

Non-Electric Plates


High Intensity Induced Roll

Non-Electric and Electric Pulleys

Non-Electric Drums


High Intensity Type EBK Crossbelt

Unique 4 Belt Drive Fits 2¼" Space

Transmits 34 h.p. to Operate Hydraulic Controls . . .

Unless they made costly changes, the Gerlinger Carrier Co., makers of big fork lift trucks, had only 2¼" on the crankshaft available for the hydraulic pump drive.

A standard V-Belt drive to carry a load up to 34 horsepower would have required 5½". It appeared that a chain drive was the only type that could handle the load and fit the space. Early trucks, therefore, were equipped with chain drives on the hydraulic pumps.

In service, however, chains gave trouble. It was impractical to encase them and their speed was so high (3000 ft./min.) that they threw off all lubricants, and wore out rapidly. Gates engineers were asked for a solution.

Drawing upon a background of more that 20 years of *Specialized* Research in V-Belt engineering, Gates engineers worked out a drive using four small specially designed V-Belts. This drive fits into the crowded space between engine and fan belt and yet has ample capacity to handle the heavy load.

V-Belt drive has many advantages

Unlike the chain drive, V-Belts require no lubrication, yet are quiet and positive and the multiple strands are an advantage because they assure uninterrupted operation. If one belt breaks, the others continue to carry the load until replacement can be made. A further advantage is that the early lift trucks can be equipped with the new drive at a minimum cost.

This is another example of the practical value of Gates engineering know-how applied to a critical design problem. Only rarely, of course, are special V-Belts required to solve such a problem, but the same engineering skill and experience is available to you—right in your own plant—for the solution of *any* power transmission problem you may have.

This V-Belt Drive is Another Practical Example of Gates *Specialized* Research

Phone for a Gates Field Engineer

Whenever you have a difficult drive to design—or if some difficulty develops on any drive in your plant or if you only want to know what V-Belts to use for the most efficient, lowest cost service on any particular drive—just pick up your phone book and call the number listed under "Gates Rubber."

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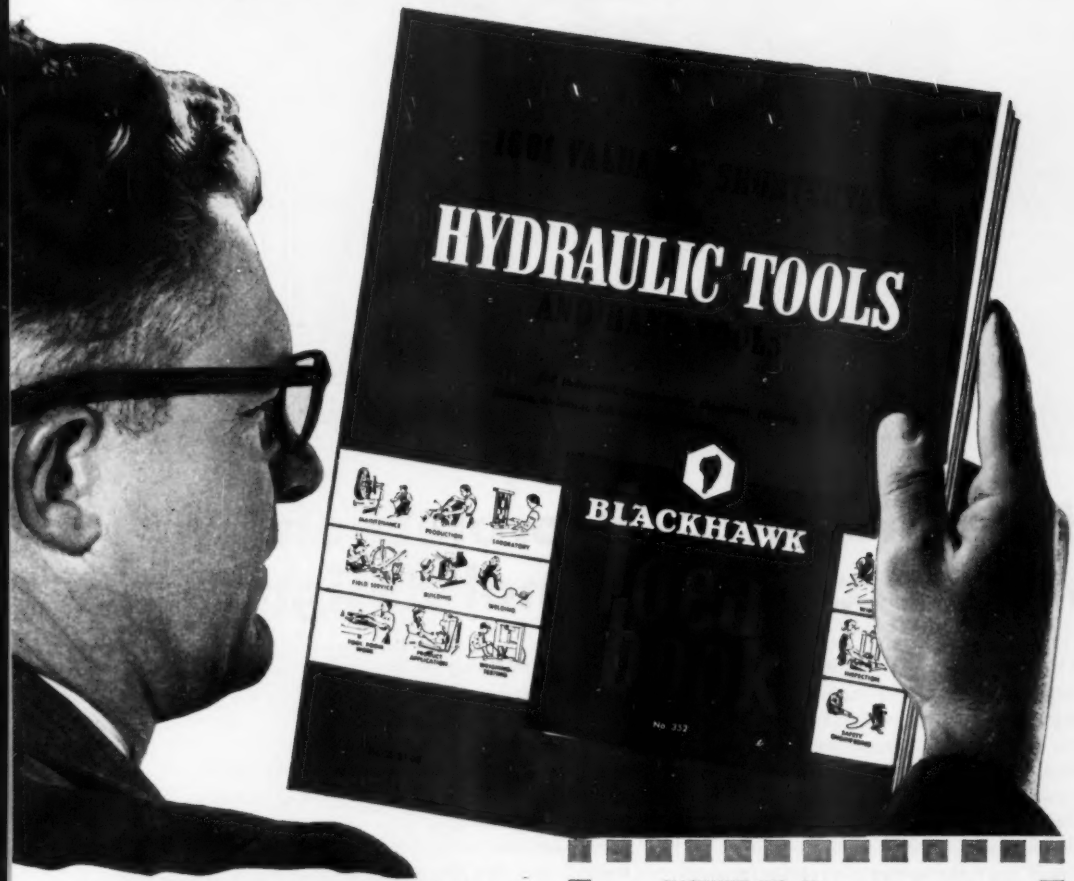

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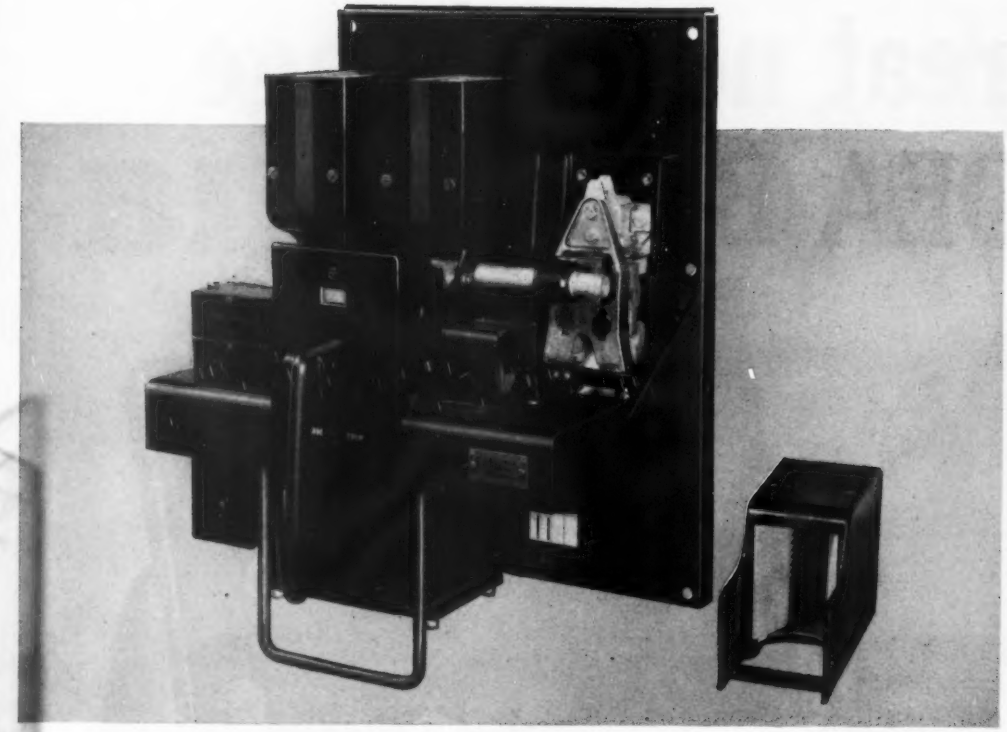

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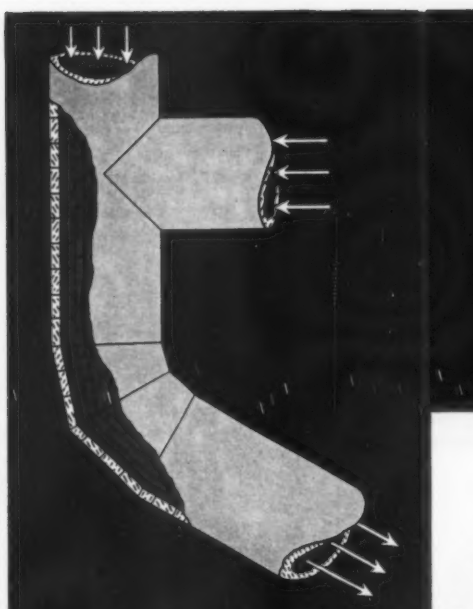

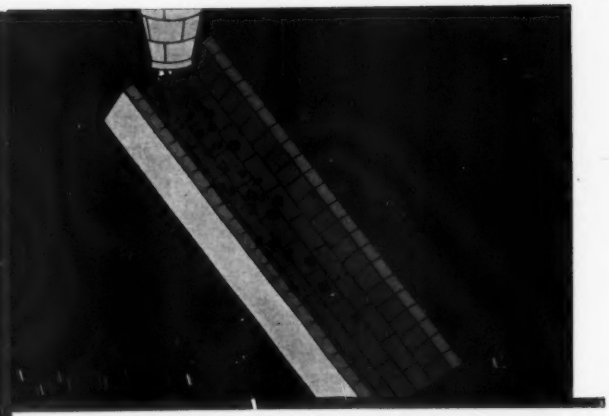

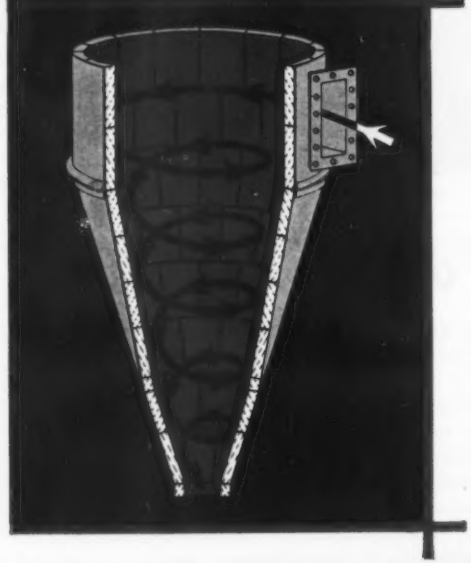

ABRASION

Used under the toughest abrasion conditions known, our CARBOFRAX silicon carbide refractories or our MONOFRAX fused cast refractories have definitely outworn metals, paving bricks and other normally durable materials. For example:

In Cyclone Dust Collectors where the blast of millions of highly abrasive particles quickly cuts away other lining materials.

In Coke Chutes and Hoppers which must withstand punishing cascades of sharp-edged coke—sometimes fiery hot.

In Hot Blast Mains which carry high velocity gases that are laden with very abrasive dust.

In Billet Heating Furnaces where massive metal slabs are pushed or dragged across the furnace floor or other bearing surfaces.

Under conditions like these, regular lining materials or bearing surfaces are worn away in short order. Not so, these two Super Refractories. They last.

Granted, abrasion is seldom an isolated condition. It's usually abrasion *plus* . . . heat, or acid attack, or some other condition. But whatever the combination of conditions, chances are, there's a Super Refractory to fit the bill. For, as you can see (box, opposite page), these materials have many other properties equally as desirable in certain applications as abrasion resistance.

Super Refractories by

CARBORUNDUM

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Refractories Division — Perth Amboy, N. J.

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SUPER REFRACTORIES ARE ALSO USED

WHERE HEAT CONDUCTIVITY IS NEEDED. At elevated temperatures CARBOFRAX refractories conduct heat *almost as rapidly as chrome-nickel steels!* This characteristic is invaluable in checkers, muffles, hearths, radiant heating tubes, etc. It often radically increases the capacity of the equipment. There are also Super Refractories which are very good insulators, particularly at high heats.

WHERE CHEMICAL ACTION IS PRESENT. In general, all Super Refractories are either neutral or acid in nature. They are widely used where chemical inertness is important.

WHERE STRENGTH IS IMPORTANT. No commercial tonnage refractories have greater strength than Super Refractories. All can withstand over 300 psi at 2750° F without crushing. The modulus of rupture of one composition averages 3100 psi at 2460° F.

WHERE HIGH HEAT IS INVOLVED. They can be safely used at temperatures over 3000° F. They are very durable—are highly resistant to spalling and cracking. Some varieties are almost indispensable where flame impingement or violent temperature changes are present.

that will cut through metal

hardly touches these materials

They're the toughest known materials for large scale commercial use—so tough, they'll quickly wear out the best grinding wheels.

Have you any spots in your equipment that are vulnerable to abrasion? Areas that need constant relining or replacing? Then don't fail to investigate our CARBOFRAX bricks and shapes, and our MONOFRAX K blocks. Both materials give "armor-plated" protection. Both are extremely hard—within one index point of diamond hardness!

Possessing properties seldom associated with refractories, these, and other Super Refractories by CARBORUNDUM, are often used *regardless of whether high temperatures are involved.* Great strength and durability plus high resistance to heat, corrosion and abrasion, make them ideal for a wide range of applications.

It's surprising how often you'll find places in your equipment where Super Refractories are inherently better—and less expensive—than other materials. They're well worth investigating, particularly in this period of scarce critical materials.

Why not check up? Practically all Super Refractories are available as bricks or special shapes molded to close tolerances—including fitted joints, tubes, etc. Send today for our booklet describing the properties of these unique materials.

Information is now available on all the various groups of Super Refractories by CARBORUNDUM. Just send the coupon for our new booklet. No obligations, of course.

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Please send your free booklet describing the principal properties of Super Refractories.

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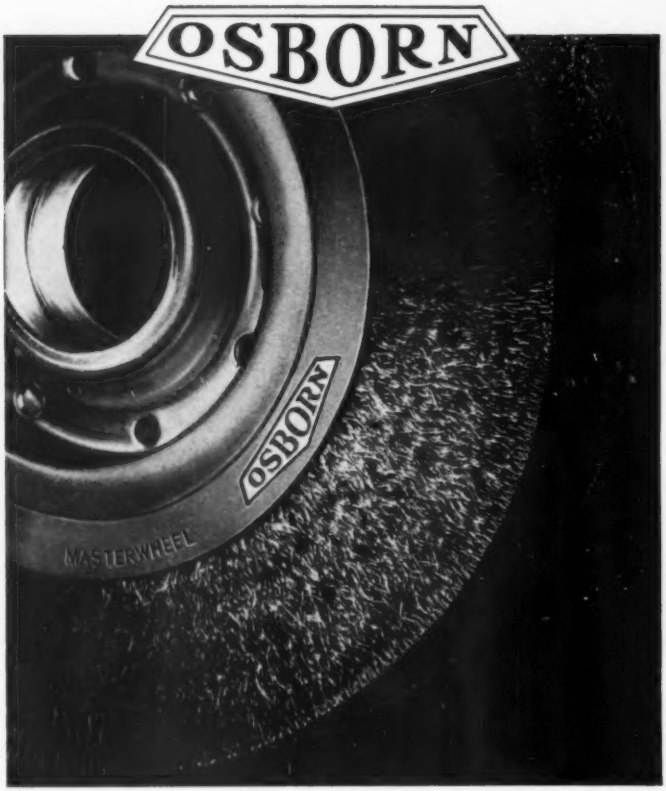

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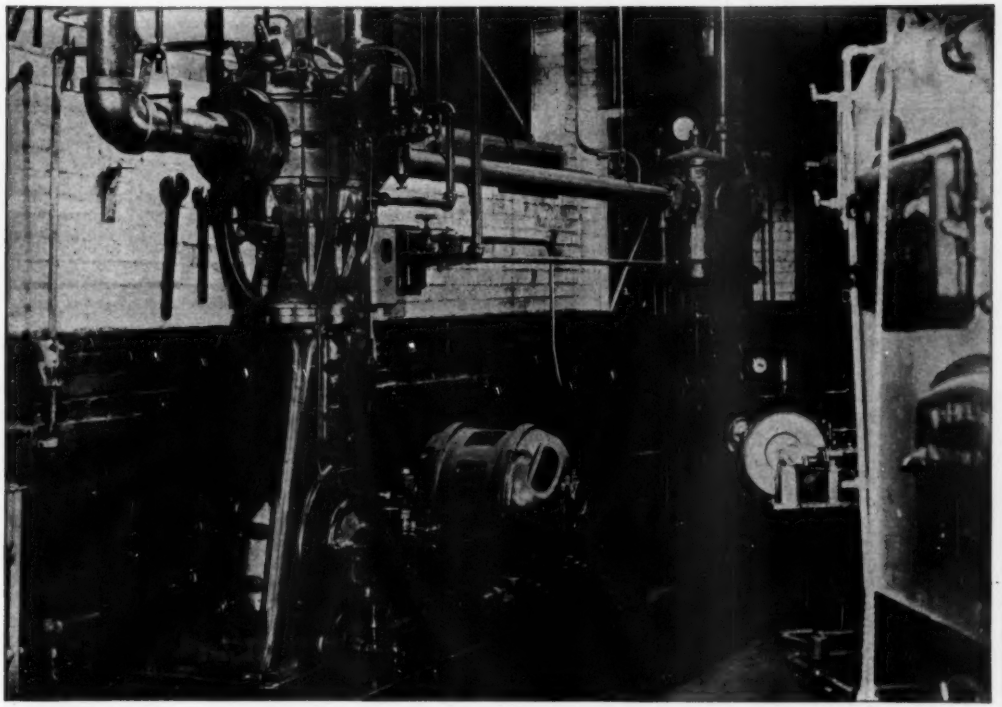

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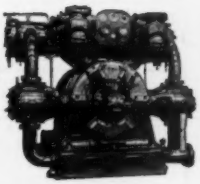
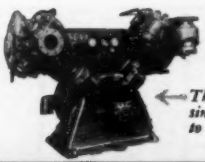
JOY WG-9 HEAVY DUTY AIR COMPRESSOR

The JOY WG-9 Vertical, with its small base, saves valuable floor space. Built in a range of sizes to 881 CFM, for continuous heavy-duty service. The complete line of JOY stationary units—high and low pressure compressors, oil-free compressors, boosters and vacuum pumps—includes a type for every need, each incorporating exclusive features developed by JOY research. Supplementary products include the only complete line of vaneaxial fans and blowers, and the new JOY Oxygen Generator. ● *Write for free Bulletins.*

The JOY WL-80, in eleven sizes up to 641 CFM, with operating pressures to 125 psi. →

The JOY WN-114, in single or twin units up to 7312 CFM. →





← *The JOY WN-112, in single or twin units up to 3656 CFM.*

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Device Checks Air Pollution

IN AN EFFORT to rid plants of fumes and dust, American Cyanamid installed control measures on existing equipment. Such installation can be extremely expensive and often presents construction difficulties. In view of this, duct and fume control systems are planned by company and construction engineers when a new project is in the blueprint stage.

Gas meter, dust filter, and selective absorbing solutions are located in protective box near the foot of the windmill

One recently devised system designed by the company's industrial hygiene section is an ingenious air sampling device which keeps a constant check on the content of prevailing winds.

This employs a windmill with long propeller-type blades that rotate in the wind, and turn a unit which pumps air through a meter, dust filter and selective absorbing solutions.

The gas meter records the volume of air sampled. The recorded figure, together with a set of figures obtained by analyzing the filter and absorbing solutions, forms the basis for calculations. These reveal the density of the fumes and dust.

The company's Bridgeville, Pa., plant uses two of these sampling devices. One is located to the windward and the other to the leeward side of the prevailing wind. Thus, it is possible to test not only the content of the wind as it leaves the plant, but also to test the wind blowing toward it from other possible pollution points. *From The Gas Line, published by Rockwell Manufacturing Co., Pittsburgh, Pa.*

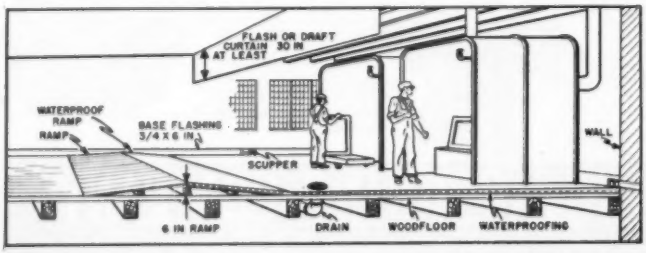
Floor Waterproofing and Drainage Protect Stock and Equipment

FLOOR WATERPROOFING and drainage are important in reducing to a minimum water damage to stock and equipment not directly involved in a fire and also to help check the spread of fire when flammable liquids are involved.

A hazardous operation with high fire frequency potentialities conducted on top or upper floors of a multi-story structure exposes stock and equipment on lower floors to severe water damage in event of a fire. Waterproofing must be done properly to be effective.

Waterproof floor surfacing must have the ability to stand-up under traffic encountered. Surfaced floors must be properly flashed at the walls, columns, pipe openings and at communicating fire doors. Drainage to effective scuppers or floor drains are other vital features.

Constant fire prevention and effort in that direction should never be allowed to lapse. The most obvious recommendation for preventing water damage or spread of fire is, "Don't have a fire!" *From Sentinel, published by F.I.A., Hartford, Conn.*



Waterproofed ramp prevents wa er from spreading to other parts of building. Ramp on left facilitates truck movement from the wood floor to the protected area

Installing Leather Belts

IN FORCING an endless leather belt over pulleys, avoid putting a crook in it. Belts, particularly those 6 in. and wider, should either be made endless on the job by means of clamps and rods or slipped on after the center distance between pulleys has been temporarily shortened.

Field splices of double ply belts are sometimes made in the same manner as those of single ply belts. This type of a splice is somewhat easier and less costly to make than the one generally regarded as standard. While it is satisfactory for many jobs, it may result in a somewhat weaker and stiffer joint.

Care should be taken to have the outside feather edge of the lap faced away from the direction in which the belt runs. This tends to protect the outside points of the lap if they should strike guards, guides or shifters. In addition, this arrangement keeps the lap from being opened by windage.

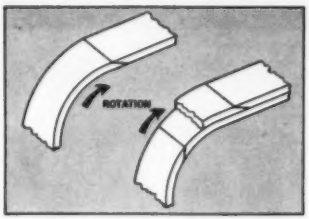


Figure presents method of splicing single and double ply belts. Grain sides are next to the pulley in both cases

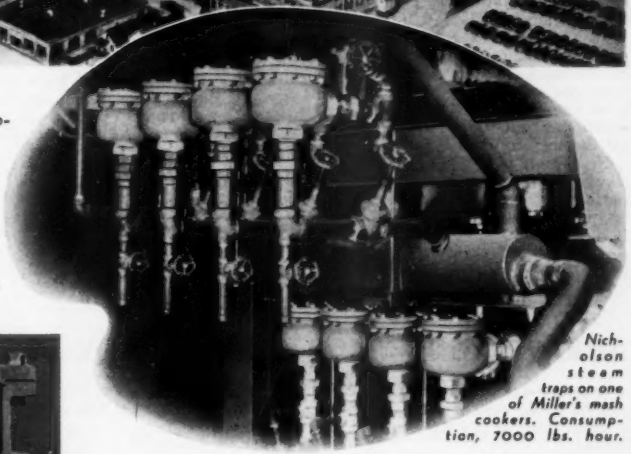
To overcome the distortion encountered in a quarter turn drive, and to distribute wear evenly on both sides, give one end of the belt a half a turn (180 deg) before making the splice. In a single ply belt made up in this way, the grain side at the joint is next to the flesh side.

This half-turn method of construction is particularly adaptable to double ply belts, which have the grain exposed on both sides. The turning of the belt side to side, also turns it edge to edge, with the result that not only is the wear distributed on the face of the belt, but the tension is also kept equalized on the edges of the belt.

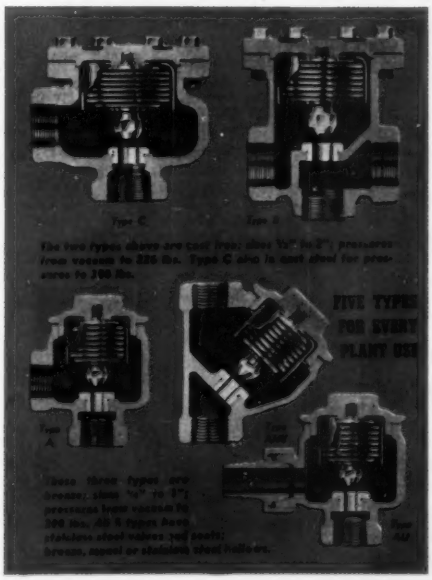
When installing quarter turn

NICHOLSON TRAPS SELECTED for New Miller Brewery

A giant $25,000,000 building program, which started in 1945, has made this Milwaukee home of nearly century-old Miller High Life beer one of the most scientifically advanced breweries in the nation. Dominated by the towering 200-feet high brew house, this vast 28-acre plant has a daily capacity in excess of 4,000,000 bottles and cans. Miller has adopted Nicholson thermostatic steam traps almost 100%. It is significant that this outstanding brewing firm, like many leaders in the other processing industries of the nation, has chosen Nicholson traps. To see why leading plants are increasingly standardizing on Nicholson steam traps for positive drainage and faster heat transfer . . . .



Nicholson steam traps on one of Miller's mash cookers. Consumption, 7000 lbs. hour.



Send for CATALOG 751
Contains installation diagrams and data for determining proper size of traps.

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PLANT ENGINEERS' DIGEST

(Digest begins on page 24)

drives it is particularly advantageous to make the belts endless with clamps and rods right on the job. Better production, fewer shut downs and longer belt life will result. *From Leather Belt Drive News, published by the American Leather Belting Association, New York 7, N. Y.*

Infrared Drying

SPECTACULAR reduction in drying time was brought about at the Kool-Vent Metal Awning Co. plant near Etna, Pa., by the installation of a 65 kw infrared tunnel. Formerly the many sizes and shapes of aluminum awning parts were spray painted and left on shop racks for air drying.

This method of paint drying required as much as 24 hr, depending on the humidity. Moving the pieces from the spray booth to the drying area consumed time and involved additional handling. Furthermore, air drying required a large area.

Now, with infrared, drying is accomplished in 9 min. The awning parts are placed on a conveyor at one end of a tunnel and travel between two banks of infrared lamps that maintain the temperature in the tunnel at approximately 350 F. Ten strip heaters aid the infrared lamps.

The quality is greatly improved because excessive handling has been eliminated. The space formerly required for drying racks is now used for productive purposes. Rejects formerly caused by uneven drying and tacky edges have been eliminated. It has been found, too, that a definite production schedule can be maintained which was impossible with air-drying because of the wide variations in drying time. *From Industrial Electric Topics, published by Duquesne Light Co., Pittsburgh, Pa.*

Aluminum awning parts are entering infrared tunnel for quick paint drying

Magnesium Machining

MAGNESIUM MACHINING involves very little fire hazard provided that a few common sense rules are observed. Hundreds of manufacturers are now machining this material with no more hazard than would be encountered with other metals.

Before ignition can occur magnesium alloys must be heated close to the melting point. Ordinary roughing and medium finishing cuts produce chips too large to be ignited readily. Fine finishing cuts produce chips which a spark can ignite. Feeds usually must be less than 0.001 in. per revolution and cutting speeds in excess of 1000 fpm before a fire hazard exists.

Attention to the following rules should be given when machining magnesium: 1. Keep all cutting tools sharp. Grind them with recommended relief and clearance angles. 2. Never use the same grinding wheel for magnesium and other metals. 3. Use heavy feeds to produce thick chips. 4. Use mineral oil coolants (4 to 5 gpm). Never use water or water-soluble coolants. When machining without a coolant, avoid fine cuts and keep speeds below 500 fpm.

Do not allow chips to accumulate on machines or clothing of operators. Remove dust and chips at frequent intervals and store in clean, plainly labelled covered metal cans.

Keep within reach of the operators an adequate supply of recommended fire extinguishers. If the chips become ignited, scatter a generous layer of one of the following on the burning area: finely powdered graphite, G-1 powder, dry sand, powdered talc, powdered soapstone, or clean, dry cast iron chips. Actively burning fires on combustible surfaces should be similarly

Shop-Made Torch Guide Adds Speed and Accuracy to Straight-Line Metal Cutting

STRAIGHT-LINE cutting in your shop can be made easier with the aid of a guide that is not too difficult to make.

The first thing to do is get a 4 in. V-belt pulley with a ¾ in. bore. Next, take a ¾ in. machine bolt, cut off the head and braze-weld a ¾ in. steel washer in its place. Then drill a ¼ in. hole to a depth of a ¼ in. at the threaded end of the bolt. Cut off the head of a ¼ in. bolt and set this in the drilled hole for braze-welding. This assembly comprises the pulley shaft.

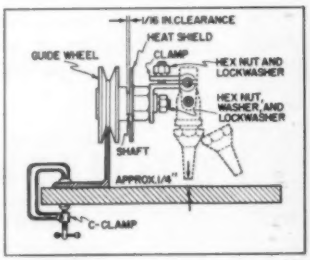
To make the heat shield take a piece of 1/16 in. sheet steel and cut out a circular disc about 4⅛ in. in dia. Braze weld this, on center, to a ¾ in. hex nut.

To make the clamp, first, a piece of ¼ in. pipe, 1 in. long, is cut lengthwise. One section of this pipe is welded to a 1/16 x 1½ x ⅞ in. angle. In the 1½ in. length, a ⅞ in. long slot is machined. Center of this slot is located ⅜ in. from the end and about ¾ in. from the top. Next, drill a hole for a ¼ in. bolt midway along the short leg and ½ in. from the back of the long leg of the angle.

Then, braze-weld a ¼ in. bolt, head removed, midway along the back of the short leg, ½ in. from the back of the long leg. The threaded portion should remain free.

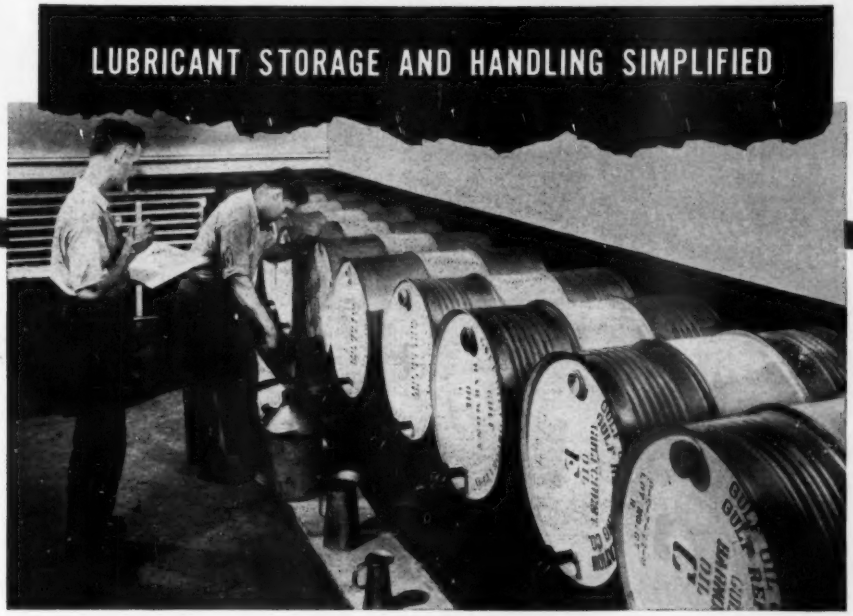
Next, take a 3/16 x ⅞ x 1 in. piece of steel and drill a hole for a ¼ in. bolt. Locate the center of this hole ½ in. from the edge of the ⅞ in. dimension and midway along the length. Braze-weld this plate to the other section of the cut pipe. Note clamp-bolt and hole alignment before doing this.

For the final assembly, you'll need a ¼ in. hex nut, a lockwasher and a plain washer for the shaft. The clamp bolt also takes a ¼ in. hex nut and a lockwasher. *From Linde Tips, published by Linde Air Products Co., New York, N. Y.*



Parts should be assembled as shown at left. View at right shows the guide in use

How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs



You'll find that a Gulf Lubrication Engineer does more than simply recommend the proper oils and greases for every type of equipment in your plant. He offers effective help on every phase of lubrication.

When, for example, he sums up his recommendations of oils and greases, he keeps two things foremost in his mind: (1) the individual requirements of each piece of machinery; (2) the problem of storing and handling lubricants.

He balances these two factors, one against the other, and reduces as far as practical the number and types of lubricants stocked and handled. In one prominent New England manufacturing plant the number was reduced from a total of 26 to 13, which meant a considerable savings in the cost of lubrication. Then too, he'll help you organize your oil house and improve your system of dispensing oils and greases.

For additional information on this cost-saving plan, call in a Gulf Lubrication Engineer today or send the coupon below.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company PE
719 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of the booklet "Gulf Periodic Consultation Service."

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Company.....

Title.....

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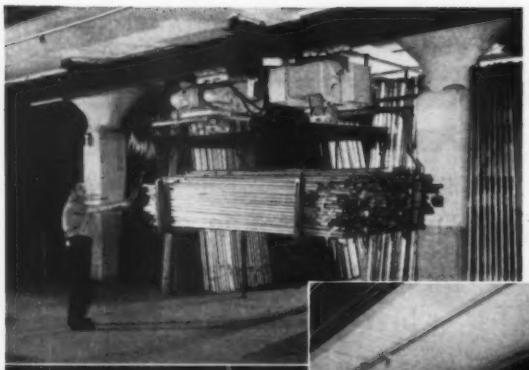
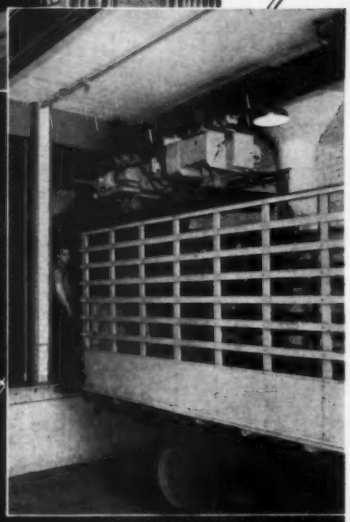


Two hoists connected with an American Mono-Tractor make up the special carrier for finger-tip transfer of heavy load.



Finger-Tip Handling Speeds Delivery TO GraybaR CUSTOMERS

Carrier runs on shielded RailMaster track over loading dock.

From warehouse stock to delivery truck, heavy loads are quickly transferred by finger-tip control with this American MonoRail Overhead Handling System.

In addition to speeding up loading and unloading time, this simple inexpensive system cut handling labor, improved space utilization, reduced material damage, and bettered working conditions.

It can be done in your plant and an American MonoRail engineer will gladly tell you how.

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE • CLEVELAND 7, OHIO

PLANT ENGINEERS' DIGEST

(Digest begins on page 24)

covered and the entire mass shoveled into an iron container or onto a piece of iron plate.

Water or any of the common liquid or foam type extinguishers will intensify a magnesium chip fire and are not recommended for use by machine tool operators. The dry powder type of extinguisher is quite effective but should be held sufficiently far from the burning chips so that the pressure of the propellent gas does not tend to scatter the fire. *From The Magazine of Magnesium, published by Brookes & Perkins, Inc., Detroit, Mich.*

Rubber Gets 10,000 Volts

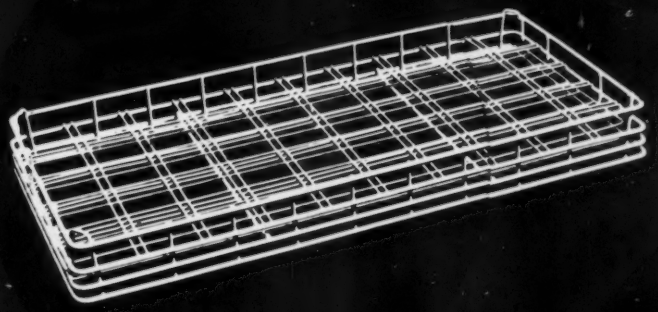
ONE OF THE GREATEST safety factors to the men who work on and near high voltage, indoors and out, in clear weather and drenching storms —linemen, underground splicers, and electricians—is the use of rubber gloves.

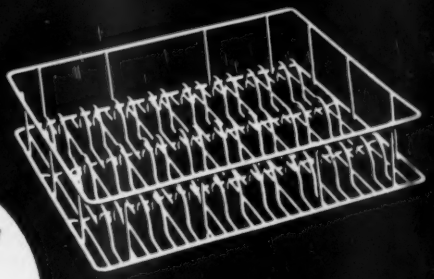
These workers must have confidence that the safety equipment that they have is in perfect condition and equal to the risk that they may have to take. This responsibility falls with the laboratory people who exercise extreme caution in testing and processing goods such as rubber gloves.

A high intensity lamp is utilized to check the gloves that have been turned in. This permits easier detection of cuts, snags, and any other visible defects. Following the visual inspection, the gloves are dipped in a tank of water after they have been filled with water to within 1 in. from the top. The water in the gloves acts as one electrode and the water inside the tank serves as the other electrode.

Voltage is gradually applied at a rate of 1,000 v per sec until a level of 10,000 v is reached. Test voltage

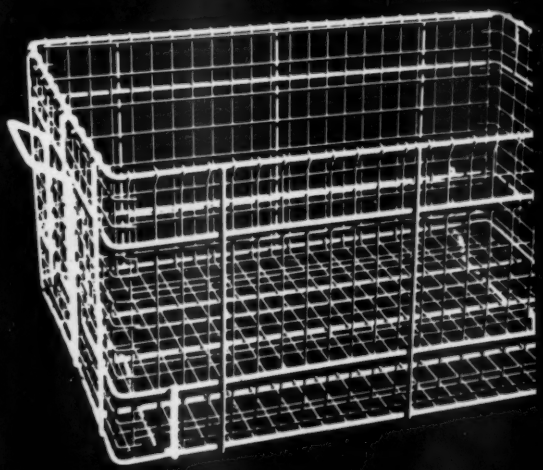
Gloves are in test position in stainless steel tank at window. Operator presses dead man's safety button with his right thumb and controls the dead front electric panel switches with his left hand





IGHT

USP degreasing or cleaning baskets are immediately available, in quantity, to meet your needs. Size, strength, material and protective finish is based upon your specification; also nesting or stacking features. Check your handling basket needs—today.



FROM ROADSTANDS...

TO LAUNDRIES

CHECK CORROSION FROM ACIDS AND ALKALIES LONGER WITH

Protecting surfaces from deterioration is a "natural" for rubber-base paint. Parlon (Hercules chlorinated rubber) in protective coatings adds specific resistance to the action of chemicals, gases, moisture, mold growths, and other destructive agents.

Parlon rubber-base paint dries fast . . . seals and protects surfaces . . . resists acids, alkalies, fumes, and salts three to four times longer than ordinary coatings. Rubber-base paint is especially helpful in solving maintenance problems for laundries where moisture, humidity, and alkaline solutions are present, and for roadstands where kitchen heat and fumes are part of the working environment.

Parlon rubber-base paint is particularly durable on concrete because of its resistance to free alkali in cement. Ask your paint supplier about easy-to-apply and economical-to-use rubber-base paint—or write direct for details.

HERCULES POWDER COMPANY
Cellulose Products Department
966 Market St., Wilmington 99, Delaware

RUBBER-BASE (PARLON)® PAINTS

CR52-3

PLANT ENGINEERS' DIGEST

(Digest begins on page 24)

is held steady for three full minutes; this time and voltage are sufficient to seek out any weak spots and puncture the rubber.

At the end of the 3 min test of all gloves, milliamp readings are taken of the current leaking through each individual glove. It may seem strange to speak of a rubber glove leaking current, but at 10,000 v even the most perfect insulation shows a slight leakage. This leakage takes place through the entire area of the glove. Although the gloves are tested at 10,000 v, strict instructions are given to the men never to use them on voltages higher than 5,000 v to ground.

After the tests are completed, defective gloves are cut and torn so that there is no remote possibility of their ever being used again. The practice of vulcanizing patches over the punctured area is not allowed. Gloves showing excessive leakage are rejected and the good gloves are hung on a wooden drying rack. They hang there until perfectly dry, without the use of forced air.

Gloves that have passed the ordeal are boxed in cardboard containers and are sealed with paper tape. Workmen are not supposed to accept the gloves unless they come in a sealed box.

From a small beginning about 30 yrs ago when 347 pairs were tested, the lab now tests about 2500 pairs per year for the company and affiliated utilities, contractors and others. In the history of the company and the lab, no lineman had ever been injured because of a defective pair of rubber gloves. *From the Illuminator, published by the Hartford Electric Light Co., Hartford, Conn.*

Damp Buffing Tile Floors

WITH PRACTICE, damp buffing of floors can be mastered to the point where the operation saves time and produces good looking surfaces.

Here's how to go about the process of damp buffing: Mix 2 qt. of water wax, 2 qt of neutral liquid scrub soap with 2 gal of hot water. Thoroughly saturate the wet mop and squeeze out the surplus. Go over an area about 4 ft wide and 10 ft long. Allow it to stand until dry streaks appear, then start buffing with No. 3 steel wool pads under your floor machine. Run the machine in small circles and bear down on the handle. The friction kicks off the loose dirt and takes out rubber marks.

When finished with the room

"DEAD STORAGE" AREA AT NIGHT . . . . . TRANSFORMED INTO ACTIVE MARSHALLING YARD BY G-E OUTDOOR INDUSTRIAL LIGHTING

Small investment in G-E lighting doubles value of outdoor work areas

A LIGHT FOR EVERY NEED is available from G.E.'s full line, for example: **A** High efficiency, lightweight, easy-to-install area floodlight for crossarm mounting, with three beam spreads; **B** Heavy-duty, wide variety of mountings and beam spreads; **C** Inexpensive, open floodlight for closer-range illumination.

You can use your plant's outdoor areas just as efficiently at night as you do during the day by adding outdoor lighting. And the cost of this productive lighting is insignificant compared to your present investment in outdoor work areas.

SPEED UP MATERIALS HANDLING

Tighter production schedules, congested plant facilities, and many other factors make it necessary for you to handle raw materials, parts, and products at night. With 'round-the-clock "daytime" provided by G-E outdoor lighting, fast, efficient materials handling is made possible, with a minimum of mistakes or damage. In the plant pictured you can see how an area, almost useless in the dark, became a productive asset.

PROTECT PERSONNEL, PLANT PROPERTY

The right outdoor lighting can pay big dividends in preventing accidents, pilfering and sabotage. But it is important to get lighting that serves your needs best—money spent on inadequate lighting is often wasted. To get more information on General Electric's full line of outdoor lighting for industrial plants, write for bulletin GEA-3640, to *Section 451-172, General Electric Company, Schenectady 5, N. Y.*

OUTDOOR INDUSTRIAL LIGHTING

GENERAL ELECTRIC

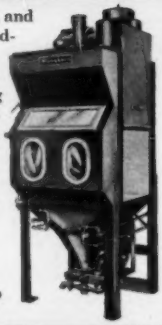
Here's BIG NEWS on Blast Cleaning Dust Control Precision Finishing

Blast Cleaning Unit is PORTABLE!

Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from.....$170.00 and up

Hydro-Finish SPEEDS POLISHING!

Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from $1410.00 and up



STOP DUST at the SOURCE!

Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from $286.00 and up

COMPACT Blast Cabinet for SMALL WORK!

Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from $319.00 up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Pangborn

MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....

Company.....

Address.....

City.....Zone....State.....

PLANT ENGINEERS' DIGEST

(Digest begins on page 24)

sweep with a broom or dust mop to move the loose dirt out, then polish with the polishing brush. You have cleaned-waxed-and polished all in one operation.

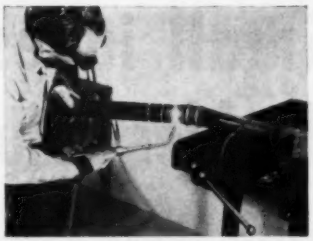
On the other hand if you must scrub, use neutral scrub soap and hot water and do not flood the floor. Mop on enough to saturate the surface, let it stand for a few minutes and scrub with the machine. Use steel wool pads if you wish but pick up the solution as soon as possible with wet pick-up. Rinse with clean water and again pick up.

Let the floor dry thoroughly before waxing, and do not apply more than two thin coats, polish the last coat or both coats if you have time. *From Custodian Training, published by L. O. Thompson, Redondo Beach, California.*

Wrinkle-Bending

IN THIS PROCESS, which is not applicable to cast iron pipe, use a blowpipe to heat a ¾ in. wide band about ⅔ of the way around a pipe selected for bending. Apply force until the heated section upsets or wrinkles.

The first step is to draw the bend pattern and then chalk wrinkle guide marks on the pipe. These marks should be at least 1½ in. apart. Then with the pipe firmly clamped in a vise, heating with a neutral flame should begin. When the section has been heated to a light red the pulling force should be applied to form the wrinkle. *From Linde Tips, published by Linde Air Products Co., New York.*

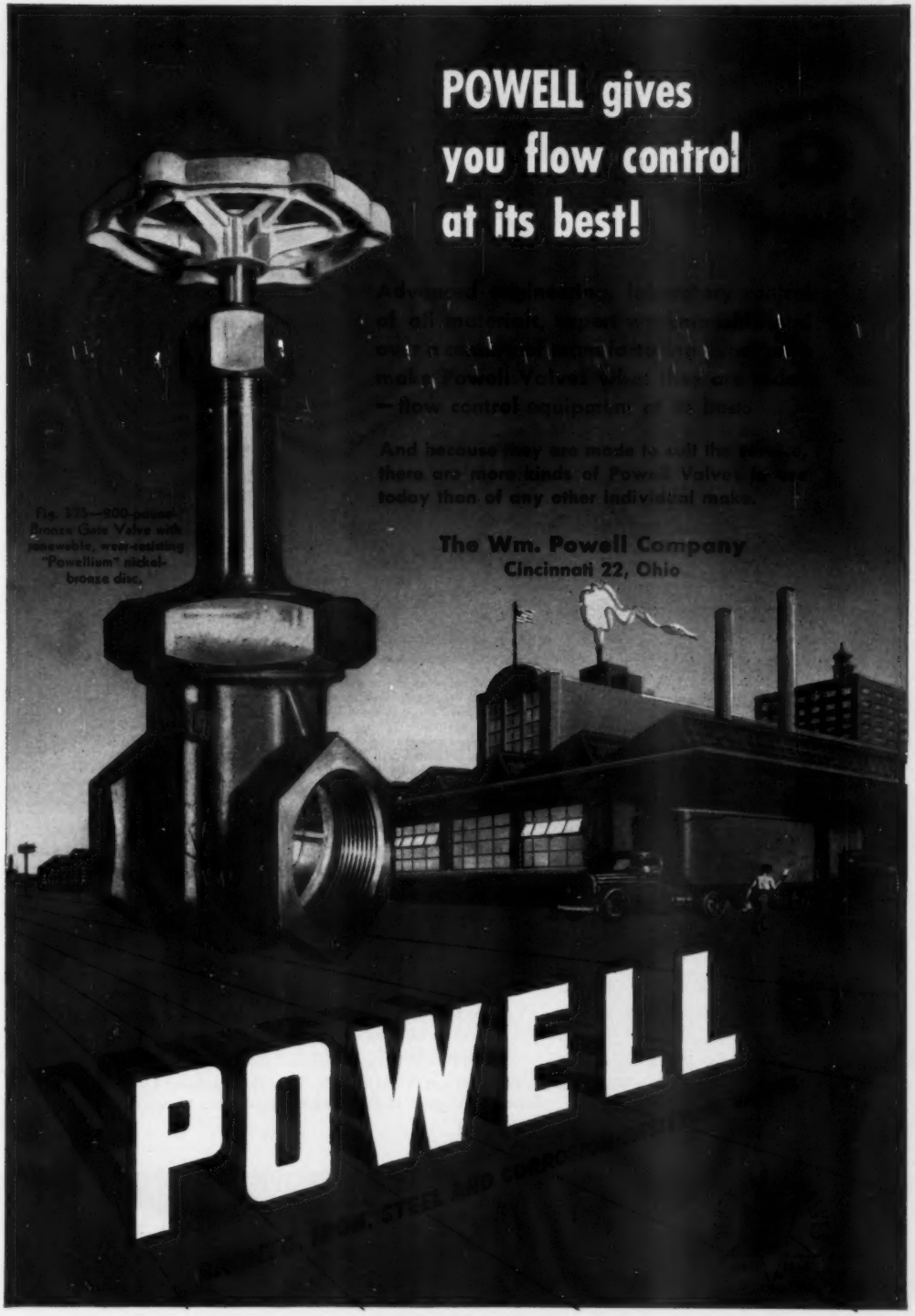


Blowpipe is used to heat marked pipe portions. Pulling force forms wrinkles

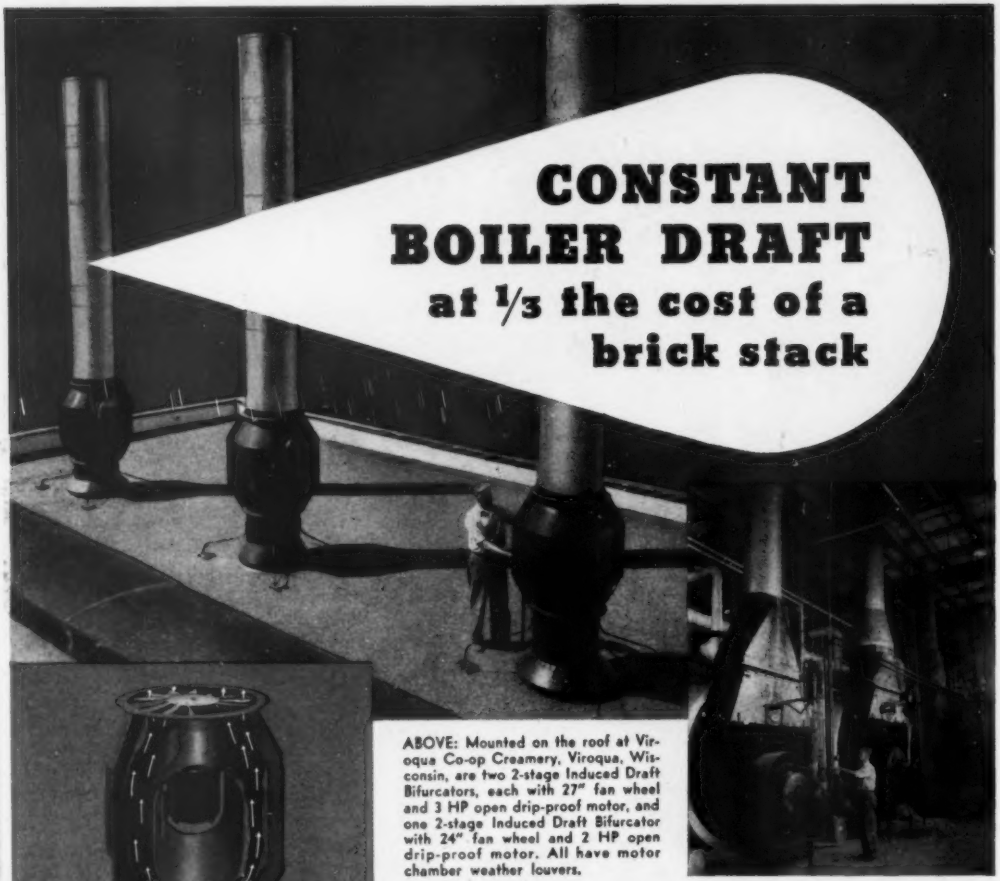
Machine Scraping

A LITTLE group of less than a dozen skilled men save Lockheed an equivalent of $600,000 per year. The company's machine tool rebuilders patiently spend many hours in hand scraping with carboloy-tipped hand

(Continued on page 38)


POWELL gives
you flow control
at its best!
The Wm. Powell Company
Cincinnati 22, Ohio
POWELL

CONSTANT BOILER DRAFT
at 1/3 the cost of a brick stack



ABOVE: Mounted on the roof at Viroqua Co-op Creamery, Viroqua, Wisconsin, are two 2-stage Induced Draft Bifurcators, each with 27" fan wheel and 3 HP open drip-proof motor, and one 2-stage Induced Draft Bifurcator with 24" fan wheel and 2 HP open drip-proof motor. All have motor chamber weather louvers.

HOW BIFURCATOR FAN WORKS

The Induced Draft Bifurcator is a direct motor driven fan in a divided housing. The motor is in an isolated chamber around which the flue gases are by-passed. Thus the motor always remains cool, clean and easily accessible. Induced Draft Bifurcators are available with fan wheels from 12" through 36" in diameter, for high pressure boilers delivering up to 60,000 pounds of steam per hour and for low pressure boilers delivering up to 190,000 EDR.

If you have a difficult stack problem, read what Sylvan Dregne, manager of the Viroqua Co-op Creamery, says:

> "We have two 200 and one 125 HP oil-fired boilers. During our busy season, we use two boilers for about 15 hours a day, 7 days a week and the one boiler for about 5 hours more after the peak load is over. We installed the Bifurcator Fans in September, 1951, and we have used them since then without any service required. They have proved to be very satisfactory, and they maintain a constant draft regardless of weather conditions. We installed these fans for approximately 1/3 the cost of a suitable brick stack."

How much can YOU save by installing Induced Draft Bifurcator Fans? Ask your DeBothezat representative or write our factory for details.

DeBothezat Fans

Division of American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

BULLETINS just released and of immediate plant interest

MAINTENANCE

101 Floor Care Manual—"Floors without Flaws" is a 12-pp practical guide for economical and efficient care of a wide range of floorings. Covers conditioning, repairing and maintenance methods for concrete, asphalt tile, cork, linoleum, magnesite, terrazzo and wood. Twelve of company's floor maintenance products are discussed as to application, advantages, coverage. A. C. Horn Co., Inc.

102 Masonry Water Repellent—Technical Data Guide 40 gives details on Hydrocide SX, a colorless silicone product for making all types of above-grade porous masonry water repellent. Tells what this coating is, how it works. Results of tests covering performances at low temperatures, paintability of treated surfaces, resistance to efflorescence are discussed and special advantages explained. Bulletin also tells how to apply Hydrocide SX, includes suggested coverage. L. Cornelborn Sons, Inc.

103 Protecting Masonry Structures—This 20-pp booklet describes a heavy self-sealing protective coating, Dum-Dum Masonic, which can be applied many times thicker than paint and affords increased protection. Illustrations show restoration and protection of 19 types of masonry structures against wind, weather, fumes and heat. Before-and-after photos demonstrate possibilities. The Arco Co.

104 Raincoat for Walls—This small folder describes Stonseal, a water repellent liquid chemical for use on brick, concrete, stucco, other masonry. Explains how Stonseal penetrates to masonry pores, changing the capillary force from one of sucking in water to one of shedding water, at the same time permitting the masonry to "breathe." Tells advantages of this coating, how to apply it. Stonhard Co.

105 To Protect Concrete Floors—This bulletin describes Armor, a strong, heavy duty cement developed to bond perfectly to concrete and intended for quick permanent repair and resurfacing jobs. Provides test data. The Monroe Co., Inc.

106 Heavy Duty Paints for Industry—Illustrated with full color paint chips covering the extensive line of industrial paints described, this 30-pp catalog lists aluminum paints, asphalt paints, masonry coatings, high heat paints, enamels, varnishes, interior finishes and other coatings. Discusses each in detail, giving hints on how to apply, coverage, drying times. Includes practical painting guide and suggestions on surface preparations. Valdura Div., American-Marietta Co.

107 Protective Coatings—Subjects of special interest in this 4-pp condensed catalog include a list of chemical agents against which company's coatings have been found effective, five case history studies, and a three-point analysis of the advantages of maintenance painting by this method. Prufcoat Laboratories, Inc.

108 Tough Lining for Tanks—Bulletin 500 presents information on Carbo-Kote 6020, a Furan base thermosetting resin for lining tanks, protecting process and mechanical equipment against corrosion. Discusses excellent corrosion resistance of the material, tells uses. Gives directions for preparing surfaces for it, describes a primer for use with it. Also covers the preparation of the Carbo-Kote 6020-catalyst mixture and application procedure, hardening time, coverage and prices, also formula variations. Carboline Co.

INSTRUMENTS, CONTROLS

110 Pocket Guide on Watthour Meters—Bulletin GET-3276, a handy 35-pp booklet for the selection and installation of company's watthour and demand meters explains uses of the meters while pointing out basic considerations pertinent to selection. Contains simplified selection tables, descriptions and clear-cut wiring diagrams of the meters used in most systems. Also, instrument transformers and demand devices are discussed for energy, power measurement. General Electric Co.

111 Meter Selection Booklet—Liquid meters for measuring 100 different industrial liquids in processing, batch mixing and cost control operations are described in Bulletin 500, 20 pp. More than 30 positive displacement type meters are covered. Booklet lists liquids that can be handled and gives capacities. Neptune Meter Co.

112 For High Pressure Metering—Catalog 40, 12 pp, describes variable-area flow meters with precise, economical, tapered metal metering tubes. Discusses company's Armored Flowrator meters designed for both high temperatures and pressure and for use where liquids hammer and hazardous fluids make some meters impractical or dangerous. Besides providing complete data on various types of these meters, catalog features a section on meter extensions. Fischer & Porter Co.

113 Modern Scales—Condensed Scale Catalog, 11, 28 pp, is a handy reference text on modern scales for every industrial need and covers some standard models weighing from 1/64th oz to 400 tons. A compact edition of company's big catalog, this new publication includes specifications, spot illustrations and essential information. It is indexed, arranged by types of weight indication. Features scales with beam indication, company's Tape-Drive dial, Weightograph projection and Teleprint remote recorder. The Howe Scale Co.

114 Automatic Controllers—Eight types of company's Model 40 controller, widely used in process applications, are described in 32-pp Bulletin 461. Shows how, with standard specifications, or available modifications, each type can be specifically engineered to its application, whether controlling temperature, pressure, flow, pH, conductivity or other process variable. The Foxboro Co.

115 Where Heat Can Damage—Eight-pp Form 4703 describes the Alnor Pyrotac, a new temperature control unit for automatically monitoring up to 20 temperature points a minute. Explains advantages of the unit, tells how it works, discussing safety and protection features. Tells how manually operated pyrometer systems can be converted with motor driven switches. Illinois Testing Laboratories, Inc.

116 For Electric Control Systems—Recently released 8-pp Bulletin 23 gives technical information on the Frahm reasonant reed frequency sensitive relay, which can be built to have any nominal frequency between 50 and 900 cycles. Response and impedance characteristics are charted. Response, impedance, mounting are discussed, also auxiliary relay. Dimensions, standard ratings given; diagrams showing auxiliary relay circuit included. James G. Biddle Co.

117 Electronic Flowmeter—Publication 1050 describes and pictures an electronic flowmeter and tachometer designed to eliminate bearing maintenance, friction drag and high pressure drop. Construction and operation of meter are discussed, high accuracy stressed. Includes sizes, specifications. Potter Aeronautical Co.

118 Wired Television—Bulletin 1023-A introduces company's new model Utiliscope, which has same performance characteristics as previous model, but is improved in appearance and serviceability. Pictures monitor unit, camera and power unit utilized, explains how this equipment permits an observer to "see where he can't look." Typical uses of the Utiliscope in centralized control, remote observation of dangerous operations, quality control described. Diamond Power Specialty Co.

119 Boiler Water Controls—Illustrated Bulletin SC-3 is a 24-pp catalog designed primarily as a workbook to help in the selection and application of company's safety devices for steam and hot water boilers and heaters. Book is organized to display products according to function: water feeders for steam and hot water boilers and for receiving tanks; low water fuel cut-offs for low and high pressure boilers, float operated switches, relief valves etc. Capacity curves, dimensional drawings and engineering data provided. McDonnell & Miller, Inc.

120 Crane Hoist Control—A new a-c crane hoist control, the Load-o-matic, is presented in 8-pp Booklet B-5417. Operation of control is explained by using the analogy of a man raising or lowering a weight manually—each hoisting action being compared to a man's physical actions in accomplishing the same results with a small weight. Also covered are construction, mounting and performance characteristics. Motor speed-torque curves show how Load-o-matic control compares with other forms of crane control. Westinghouse Electric Corp.

122 For Wide Ranges of Speed—Tachometers for speed measuring applications where a wide range of speed measurement is desired in a continuously indicating switchboard instrument are described in Data Sheet 42P. Metron Instrument Co.

CONSTRUCTION

124 Transparent Plastic Sheet—Homalite CR-39, subject of this 12-pp booklet, is described as a clear, hard thermosetting

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July, 1952

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

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Also, use this card for more information on advertised products.

plastic comparable in many ways to polished plate glass, and having great resistance to abrasion, practical immunity to attack by solvents and absence of crazing. More than 20 uses listed. Properties of this plastic are given along with those of plate glass and cast methacrylate. Booklet also discusses the handling and storage, fabrication, mounting and installation. The Homalite Corp.

125 Hold Everything Frames—This 6-pp folder introduces a versatile steel framing material Muit-A-Frame, incorporating channel frame, spring T-bolt, and locking units. Sketches show how easily these basic units are assembled, installation photos picture some popular applications—storage racks, pallet racks, cable racks. Many others listed. Pointing out a dozen ways in which Muit-A-Frame can provide worthwhile savings, bulletin stresses economy of framing material which can be built to present needs, later moved, adapted or converted. Ainsworth Mfg. Corp.

126 Handbook on Building Materials—This, the 31-pp second printing of manufacturer's reference manual, contains a complete listing of 800 building materials and industrial products obtained from asbestos, asphalt or magnesia. Shows Army, Navy, Federal and other specifications, plus their corresponding product. Shows if products meet required specifications. Information is cross-indexed. The Philip Carey Mfg. Co.

127 Laminate with Possibilities—Reinforced plastics, a versatile new low pressure laminate of reinforced Fiberglas, nylon or other materials, is described in detail in this 16-pp brochure. Said to be lighter than aluminum and as strong as steel, the product has a unique combination of mechanical, thermal, electrical and other properties. Filled with photos, booklet covers production of flat panels, matched die and vacuum bag molded parts, expanded plastics, sandwich construction, laminated phenolics. Russell Reinforced Plastics Corp.

128 Sectional Shelving — Prefabricated wood shelving for quick erection is described and illustrated in this bulletin. Tells how shelving is constructed, how to assemble it. Includes sizes and prices. The National Corp.

VENTILATING AND DUST CONTROL

130 Putting Air to Work—Just off the press, Catalog 600 is an excellent, 60-pp reference text on air and the products manufactured to put it to work. For plant engineers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's packed with information on selecting and applying equipment, and there is a section of frequently-used reference data, charts and tables. Sturtevant Div., Westinghouse Electric Corp.

131 Fans for Tough Exhaust Jobs—This is an 8-pp revised edition of company's catalog on Bifurcator fans, designed for exhausting fumes or gases which are abnormally hot, flammable or explosive. These are direct motor driven fans in divided housing, with motor mounted in separate chamber isolated from destructive gases. Catalog contains specifications, dimensions, capacities. DeBothezat Fans Div., American Machine & Metals, Inc.

132 Ventilating Duct—Spiratube M, a flexible, lightweight reinforced fabric duct developed for underground and similar ventilating jobs, is described in illustrated Catalog G2-3, 8 pp. Discusses the duct's versatility, easy handling and installations; also lower fan loads and reduced maintenance possible. Flexible Tubing Corp.

133 Low Cost Dust Control—Product Bulletin 350 gives technical information and complete specifications on company's Uni-Filters, stressing their value in controlling dust from individual scattered sources. Tells applications, illustrates several installations. Dracco Corp.

134 Dust Collecting in Roofing Manufacture—Another of this company's interesting industry reports, Bulletin 523 covers application of Dustube collectors in manufacture of roofing shingles, showing how collectors resulted in better working conditions, better quality control, substantial recovery of usable materials. American Wheelabrator & Equipment Corp.

135 Propeller Fans—Five types of 30- to 48-in. portable fans and 20 models of 27- to 72 in. exhaust fans are illustrated, described and rated in Bulletin 100. Specifications included, installations pictured. The Manufacturers Equipment Co.

ELECTRICAL, LIGHTING

136 Squirrel-Cage Induction Motors—Construction features, ratings and dimensions of open drip-proof and splash-proof squirrel-cage induction motors in ratings of ½ to 100 hp are described in 6-pp Bulletin 51B6216D. Allis-Chalmers Mfg. Co.

The post card below needs no postage. Use it to order bulletins by listing item numbers of all those wanted. Two other cards are provided for you on page 141.

137 Application of Large A-C Motors—Publication 1113, 18 pp, is an illustrated article discussing characteristics of large a-c motors which fit them to industry requirements. Covers highlights of synchronous motors, induction motors and motor control and gives many hints on selection of motor types for specific applications. It is replete with charts, graphs, tables, photos. Electric Machinery Mfg. Co.

138 Engineered Switchgear — Twelve-pp Catalog 521 illustrates range of manufacturer's switchgear, showing a wide variety of control equipment in low and medium voltage capacities. In addition, controls for special uses are shown. A discussion of company's engineering service tells of facilities for designing and manufacturing switchboards, control and distribution panels. Electric Service Engineering Co.

139 Circuit Breaker Study—Booklet B-5407, 28 pp, shows, by photos, the arc-quenching action of manufacturer's Air breakers. A "quick guide" gives their types, ratings, and standard and special features. For a better understanding of circuit breakers, a short history of their development is included and fundamental operating principles of modern units discussed. Engineering and application information is given for each of the eight types of breakers. Westinghouse Electric Corp.

140 Motor Case Histories—Over 100 applications of this manufacturer's Life-Line motors are depicted in 35-pp Booklet B-4769. These case histories represent a wide range of industrial jobs and most of them are illustrated. Each tells the particular problems involved, the motor choice for the job, results. Westinghouse Electric Corp.

141 Electrical Fittings—Brand new Catalog 52, 12 pp describes a line of solderless wire connectors, cable and conduit fittings and wiring devices. Profusely illustrated, contains data on company's Pres-sure-connectors for wire splicing and terminating, insulated conduit bushings, box connectors for non-metallic sheathed cables, cable locknuts, knockout plugs. Includes specifications, dimensional data. Buchanan Electrical Products Corp.

142 Hazard Takes a Holiday—The increased safety afforded by the use of company's disconnecting and lowering lighting fixtures is stressed in 8-pp Bulletin TH-52. Besides general information, contains schematic layouts and descriptions of indoor installations in sloping and flat-roof industrial structures, as well as recessed and concealed-type mountings. Outdoor installations also covered. Accessories and their applications are explained and pictured. Includes maintenance suggestions. The Thompson Electric Co.

MATERIALS HANDLING

144 Pneumatic Conveying Systems—Four basic types of conveying systems built by this manufacturer are illustrated by photos and sketches of actual installations in 8-pp Bulletin G-1. Covers stationary and portable Fuller-Kinyon systems for dry pulverized materials; the Airveyor for dry pulverized, crushed and granular materials; the Airalide for dry, fine materials, and the Fuller-Flexo for dry pulverized materials. Also shows valves, other equipment used. Fuller Co.

145 Roller Gravity Conveyors — Form 642-OPC is a 28-pp booklet containing size and specification data on gravity conveyors along with detailed construction characteristics. Because individual installations have different requirements, booklet explains how to determine roller best suited to application. Accessories are pictured and described so that a complete system can be planned, covering possible changes in direction, etc. Lamson Corp.

146 Gravity Wheel Conveyors—Bulletin 201, 24 pp, gives descriptive data on gravity wheel conveyors available in 12 to 24 in.

(Continued on page 142)

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For complete information, turn to page 8-9

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J-95156

(Digest begins on page 24)

to achieve the desired finish for the surfaces.

Although these men work on huge cumbersome pieces of cast iron, they require a touch closer than that of a jeweler. Maximum tolerance in any stage of rebuilding is 0.0004 in.

A dye is used to expose the high spots to be taken down by the scrapers. Once all the travelling surfaces of the machine have been refinished, the rebuilders then proceed to scar up their work by surface flaking. This produces tiny depressions which serve as oil reservoirs.

These cannot exceed 0.001 in. or they will capture bits of grit. If the scratches are much less they will not hold oil. Machine wear

Shiny milling machine gets finishing touches prior to going back on the line

results from either of the two conditions. Hence flaking must be done just right.

It is reported that the company's average machine replacement cost would be around $10,000 per unit. Under the rebuilding program, a machine can be rebuilt for about $1,500, parts and labor. Because a lot of the machine tools run around 24 hrs per day, they are normally rebuilt once every 5 yrs. *From The Lockheed Star, published by the Lockheed Aircraft Corp., Burbank, California.*

Coating with Tin or Lead

Do you have use for a simple and effective method of applying tin and lead on a metallic surface?

To tin coat a copper or brass article, make sure that it is clean. Then immerse it briefly in a solution of sodium stanate and sodium cyanide, or in an acid bath which contains thiourea; then dry it. It's as simple as that.

The chemistry of the process, in

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PLANT ENGINEERS' DIGEST

(Digest begins on page 24)

general, is the replacement of tin in the bath by copper dissolving from the metal. When the copper becomes completely coated, the action stops and no additional coating is built up. This results in a relatively thin coating, but one which is complete and gives a good degree of protection. Thickness depends on the time of immersion and is generally within the range of 0.001 in.

The tin not only adds resistance to corrosion, such as in copper tubing used to carry water, but also gives a coating conducive to soldering. The latter would be particularly valuable in coating electrical contacts.

The lead-immersion process is somewhat similar. It consists of a lead containing bath that is operated close to its boiling point. The bath is primarily intended for steel, but also works well on copper and nickel. Of interest is the fact that the lead coating is an excellent base for organic coating. The lead coating is extremely thin, as in the case of tin, but it offers good protection to the base metal.

Lead coating is applicable to the replacement of electroplated cadmium or zinc and can be used on iron screen wire as a rust preventive. *From Battelle News, published by Battelle Memorial Institute, Columbus, Ohio.*

Mobile Bins

WITH the use of specially cut lumber, Standard Oil Company of California converted pallets used to handle asphalt products into mobile stock bins. The pallets were redesigned to handle twice the original capacity and to hold 3 or 4 different sizes of the same item. They are now used to stock large quantity items such as bolts, valves and pipe fittings.

When a pallet bin is empty, it is picked up by a fork lift truck and

Worker is shown positioning bin pallet after it was refilled while on the floor

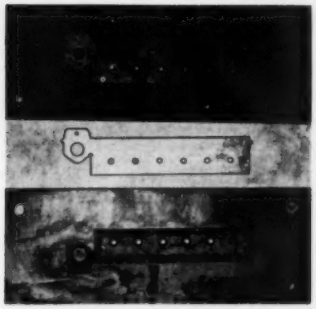
removed to the receiving platform. There it is refilled by the receiving personnel with the proper incoming item. The bin is then picked up by a fork lift and put it into its proper place.

Excess material that is received is placed in a pallet bin and spotted on top of the regular stock. As the stock in the regular bin pallet is depleted, the bin is removed for restocking. The excess bin pallet is then put in its place. The whole operation is built around a fork lift program which promotes good handling.

An advantage of this system of palletization is that excess stock can be located in a common area with regular stock. Another advantage is the open side construction of the pallet bins permitting easy disbursement of material. *From the Standard Oiler, published by the Standard Oil Co. of California, San Francisco, California.*

Blanking for Short Runs

AN INEXPENSIVE method of blanking metal and non-metallic sheet with punches and dies which save



Shown at top is the raised punch surrounded by cutting rules and ejection pads; die at bottom has similar pads. Multiple hole punch appears in center

material, time and money has been developed through the cooperation of two English firms, William Crosland Ltd. and Metropolitan Vickers Electrical Co., Ltd.

The construction of the punch and die form tools follows orthodox punch-and-die practice except that instead of steel, high density resin impregnated wood is used as the base and punch. Unchamfered tempered steel-rules surround the punch and line the die. They are similar in manufacture to the knife edge type of die used in the card-

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When the trouble is high maintenance, Moynos bring costs down. Their unique "progressing-cavity" action resists abrasives and chemicals, develops *positive pressure* without pulsation or agitation.

If disintegration is a problem, Moynos solve that, too, because *action is gentle*—without whipping or churning. These amazing pumps pass particles and solids in suspension with little or no fractioning.

Yet, with all these advantages, the Moyno is the *world's simplest pump*—no pistons or valves; only one moving part. It self-primes; develops pressures to 1000 p.s.i; delivers up to 250 g.p.m. in smooth flow.

We'll gladly tell you what Moynos are doing on work that's *just like yours*, or we'll lab-test whatever you want to handle and recommend proper size and type of Moyno. Why not ask for free Moyno Bulletin No. P-30-E.

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PLANT ENGINEER'S DIGEST

(Digest begins on page 24)

board box-making industry, capable of producing blanks from non-metallic sheets, such as rubber and certain types of plastic.

Carefully placed strips of rubber prove most satisfactory for ejecting the blanks, but this may be done by any of the normal methods. By tilting the press, ejection of the blank is made even speedier.

An advantage that the form tools have over the orthodox type is that they can be used to produce blanks complete with cut-outs or holes in one operation, as opposed to the blanks produced by orthodox tools which require additional drilling or punching. Extra punching operations also mean the use of more punches and dies which again raise the cost.

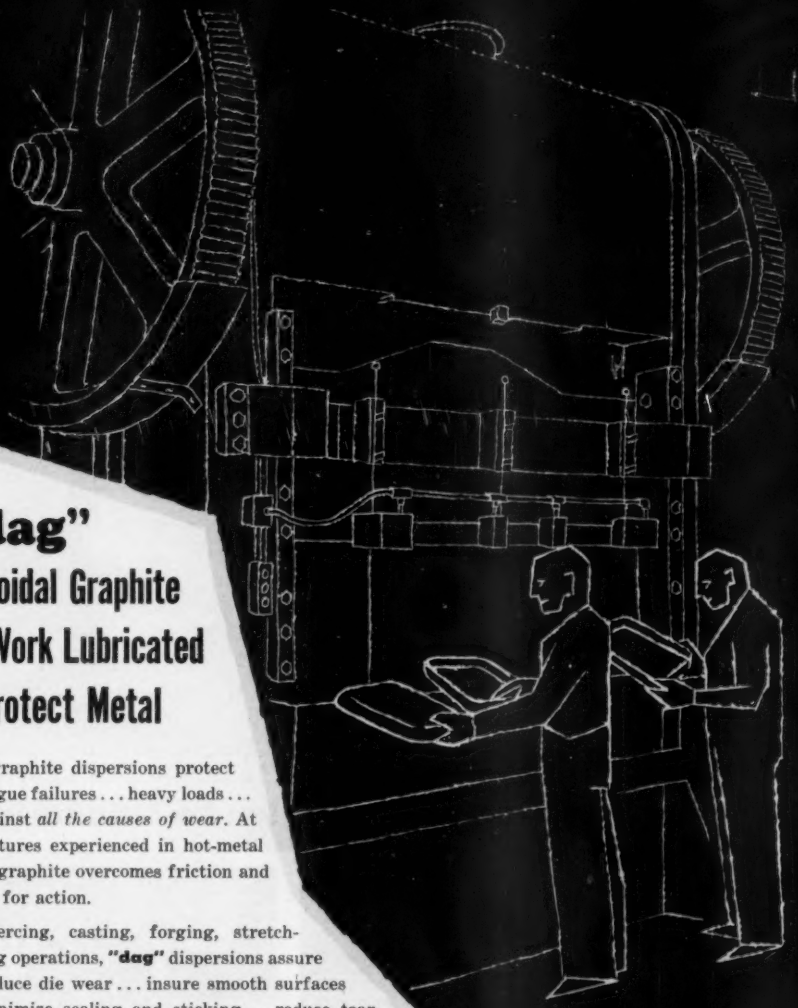
The elimination of stripper plates which permits any gauge of metal to be used is another interesting feature.

These form tools cannot replace the orthodox blanking punches and dies for exceptionally long runs, but they do fill a need where the cost of the orthodox dies would prohibit their use, causing the job to be done by hand.

By using a special tool holder, punches and dies which are tapered in standard sizes may be set up in 5 min. Where normal press blanking methods are used these steel-rule precision tools will reduce tooling costs, and represent large savings in tooling times. *From Target, published by British Information Services. 30 Rockefeller Plaza, New York,*

Wire Brush Trims Feather Edge

Stand, fitted with wire brush, trims edge from casting at White Motor Co., Cleveland. Brushing cut time from 4 min to 15 sec from operation formerly done on a lathe using emery cloth. (From news release of Osborn Mfg. Co.)



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MAINTENANCE & OPERATION of buildings, utilities and facilities

Edited by H. E. B. Anderson

Second Prize in the July PLANgineering Contest Proposes Undercutting Bolts for Strength

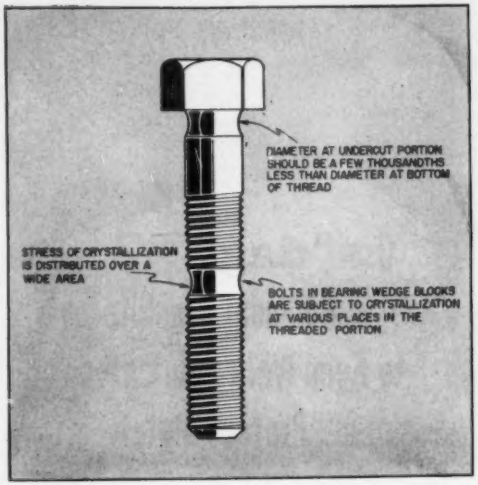
Submitted by Chester Smith, Works Engineer, Atlas Powder Co., Houghton, Michigan

IN SOME TYPES of moving machinery, cap screws and bolts are subjected to shock to the extent that crystallization of the metal frequently causes the bolts to break. In the case of cap screws, the crystallization usually occurs directly under the head. However, bolts in the wedge block of the bearing may crystallize in four different places: under the head; in the thread where the bolt enters the wedge block; in the thread where the bolt leaves the wedge block; and in the thread where the bolt enters the lock nut.

By undercutting the diameter of bolts in the vulnerable place or places, bolt life is increased almost indefinitely. The depth of undercutting needs to be only a few thousandths below the depth of the thread or the equivalent depth on the blank of the bolt under the head. All undercutting should be well rounded at both ends; square cuts, with sharp corners, will defeat the purpose.

For bolts ½ to ¾ in. in diameter, ⅜ in. length of undercut is sufficient. For bolts smaller than ½ in. in diameter and larger than ¾ in. in diameter, the length of undercut should vary according to size.

By undercutting bolts, the stress of crystallization shock is distributed over the entire area of the undercut portion instead of being concentrated in a mere line under the head, or in one thread on the bolt.


DIAMETER AT UNDERCUT PORTION SHOULD BE A FEW THOUSANDTHS LESS THAN DIAMETER AT BOTTOM OF THREAD
STRESS OF CRYSTALLIZATION IS DISTRIBUTED OVER A WIDE AREA
BOLTS IN BEARING WEDGE BLOCKS ARE SUBJECT TO CRYSTALLIZATION AT VARIOUS PLACES IN THE THREADED PORTION

Third Prize Winner in the July PLANgineering Contest Shows Drum Handling Made Easier

Submitted by John Hryczyszyn, American Manufacturing Co., Brooklyn, N. Y.

BEFORE Heavy drums of pine tar, embedded in tar that had leaked out of the drums, required the combined efforts of two men to break them loose and raise them up on end

AND NOW With this tool, devised to provide leverage on the drums, and built of pipe, strap iron and a shovel handle, one man raises drum with no dangerous straining

LEAKING DRUMS of pine tar, stored in an open lot, often presented the problem of raising a drum which had become embedded in tar. To alleviate the need for two men to raise these drums, a tool designed by the man in charge of the lot was put into use. The increased leverage obtained by using the tool is sufficient to allow one man to easily handle the tar drums in the storage lot. Thus, one man is released for more productive efforts, and the dangerous physical strain on the worker is reduced to a safe level.

The End Is Near

The closing date on PLANT ENGINEERING's monthly Production, Maintenance and Operation Contest for September is July 25th. This represents the closing date for the current contest series, which will end with the September winners announcement. You still have time to enter and become eligible for one of the cash awards in this last contest month.

That's All the Cleaning an Allis-Chalmers TEFC Motor Ever Needs

MAINTENANCE COSTS ARE LOW for users of Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors. They are easy to clean because even the stickiest dirt can be wiped or blown off without dismantling the motor or even stopping it. They seldom require cleaning because cooling air flows over the *outside* of the motor. There are no external concealed air passages to clog up and cause over-heating. You get better operational continuity, lower maintenance.

Bearings Save Maintenance, Too

Double-shielded ball bearings require no regular maintenance under most normal operating conditions. Yet if difficult service makes re-lubrication desirable, it can be done without dismantling the motor or bearings. Rigid cast iron frame and stiff end brackets maintain bearing alignment . . . assure maximum bearing life.

A-3639

Texrope and *Vari-Pitch* are Allis-Chalmers Trademarks.

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PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

MAINTENANCE & OPERATION

(M and O begins on page 44)

Screwdriver Blades Detachable

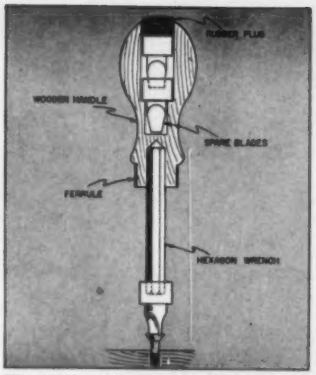
Contributed by F. E. Riley

A HEAVY-DUTY screwdriver utilizing detachable blades of various widths can be a useful addition to a tool kit. A large file handle is fitted with a shank made from an Allen wrench, and the top of the handle is drilled out to form a storage pocket for additional blades.

The additional blades are made from socket head bolts (which are about the correct hardness for blades) with the shanks shortened and ground to a blade shape. Various blade widths are stored in the handle, where they are held in place by a rubber plug.

The lower end of the shank can be slotted and spread, to provide a slight compression fit in the blade sockets.

Apart from driving screws, the driver can be used for inserting socket head bolts in confined spaces where there is not enough room to swing a standard wrench. The shank construction permits the use of an adjustable wrench on the shank flats for extra leverage.



Wooden handle serves as blade storage pocket in easily-made screwdriver

Long-Wearing Clutch Discs

Contributed by G. O. Webster

ONE ANSWER to clutch disc wear was found in the repairs to 18, 20, and 24 in. clutches on paper machines in a Maine mill.

The repeated failure of the clutch discs required a makeshift replacement of steel discs for the fiber ones in the clutches. Life of the clutch discs has been extended to as much as 2½ yrs, compared to 1 or 2 wks formerly experienced with the fiber discs in the largest clutches.

Insulation Must Be Maintained

INSULATION maintenance is a neglected factor in many plants and often leads to costly heat losses or operating inefficiencies. The Magnesia Insulation Manufacturers Association points out that the need for maintenance may result from normal wear and tear, from failure to repair or replace insulation damaged or removed during alterations, or from routine equipment maintenance work.

Most frequently, the need for insulation repair on pipe lines can be noticed around flanges and fittings which are opened for inspection or other purposes. Pipe insulation adjacent to chain hoists, doors or other moving objects may be damaged if not properly protected. Loose tie wires or bands and damaged canvas covering should be checked and repaired, the association points out. Small fittings insulated with cement are more likely to need periodic reinsulation than pipes and larger fittings have molded insulation.

Equipment is likely to show most need of insulation repair around

Fourth Prize in the July PLANgineering Contest Describes Shop-Built Arbor Press

Submitted by E. P. Davidson, Plant Engineer, Armstrong Cork Co., Dallas, Texas

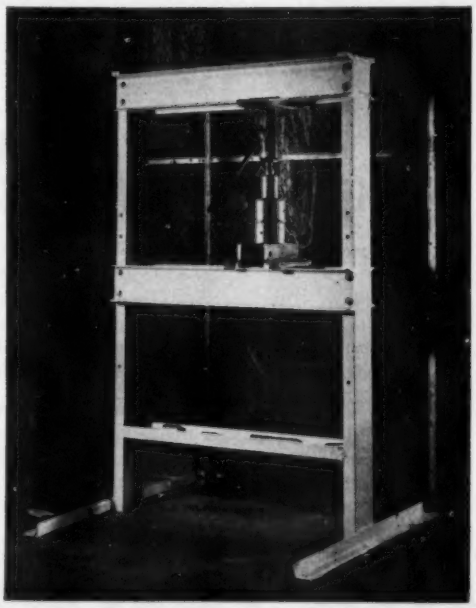
AN EVER-INCREASING NEED had existed in the plant maintenance shop for a small press to aid in removing or installing bearings, bushings, pulleys and gears. This fact, coupled with a critical look at the used material scrap pile, led to the construction of a valuable maintenance tool.

Built in the shop, around a standard 5-ton hydraulic jack, the press quickly took shape from the scrap metal. The frame was built from 30 ft of salvaged 6 in. channel, and with the exception of the bottom cross brace and legs, which are welded, the entire unit was assembled with ½ in. bolts.

The over-all dimensions of the press, 72 in. by 44 in., afford adequate working room for most jobs that can be handled by a 5-ton unit. The two cross channels which form the work table can be moved up or down to any desired location on the upright frame, using a series of equally spaced holes, drilled through the flanges of the upright channel to receive the bolts holding the table channels in place. The only operation required to change the distance between the hydraulic jack and the work table is the removal and replacement of the eight bolts.

Rather than fasten the jack rigidly to the top cross members, a sliding plate was constructed on which to hang the jack. This plate, with angle iron clips welded on each end, is suspended on the flanges of the top cross channels. This construction permits the movement of the jack from side to side on the channel, and facilitates utilization of the complete width of the work table.

The only modification necessary to the hydraulic jack unit was the installation of a tube in the oil reservoir to assure its operation in the upside-down position that it occupies on the press. The base of the jack was drilled with two ¼ in. holes to receive the bolts that secured the jack to the sliding plate. This construction made the jack easily removable, if required.



Hydraulic press illustrates simplicity of construction and points out re-use of steel shapes in plant maintenance

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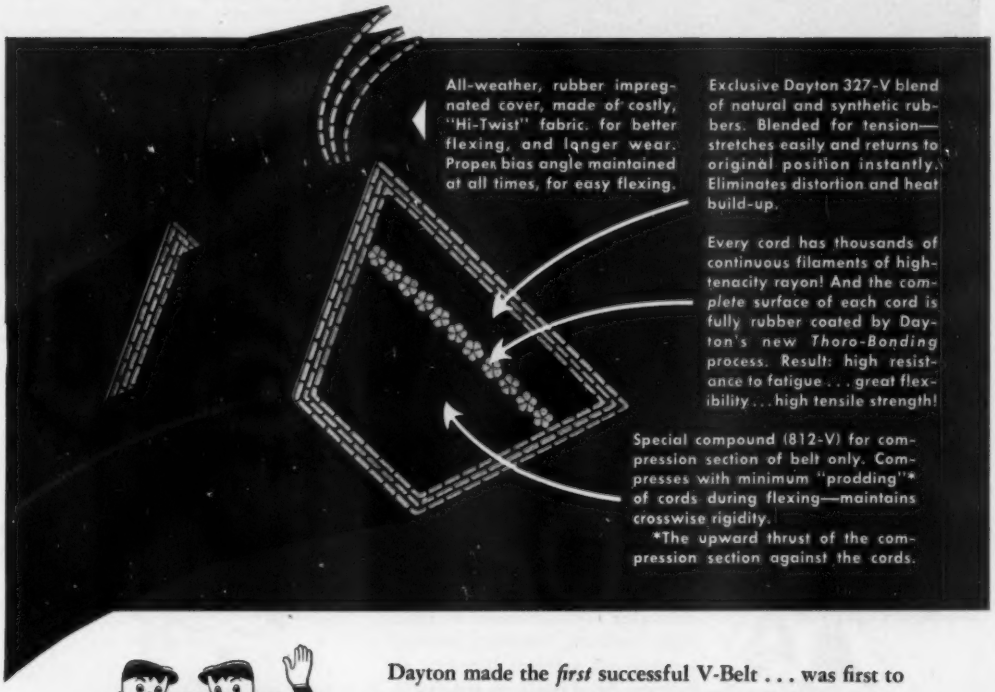
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*The upward thrust of the compression section against the cords.

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MAINTENANCE & OPERATION

(M and O begins on page 44)

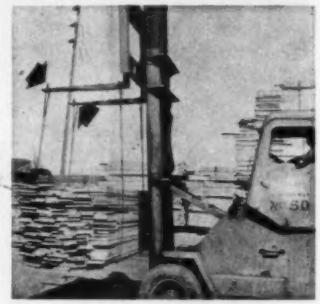
manholes or other openings where the edges are subject to hard contact and abrasion. Vibrating or rotating equipment, when insulated, should be checked frequently to assure the soundness of the fastenings. Loose tie wires or sheared stud welds may allow the insulation to sag or become completely detached.

One of the factors causing neglect of insulation maintenance is the need for stocking insulation materials of various types and sizes such as blocks, pipe sections, cement, canvas, wires and bands. This problem can be solved by arranging with an insulation contractor for periodic inspection and maintenance. Plants using such service, it is said, find that it more than pays for itself through prolonged life of the insulation and fuel savings.

Eyebolts Through Forks Hold Cables in Place

Contributed by Adam Radomski, Allis-Chalmers Manufacturing Co.

THE USE of eyebolts, inserted in holes drilled through lift truck fork tips, has eliminated a dangerous situation in unloading lumber from



Simple addition of eyebolts through fork tips makes lumber unloading safer

gondola cars with cable slings. Premature dumping of the load, time-wasting as well as dangerous, is prevented by the eyebolts holding the cable loops on the forks until the load is lowered.

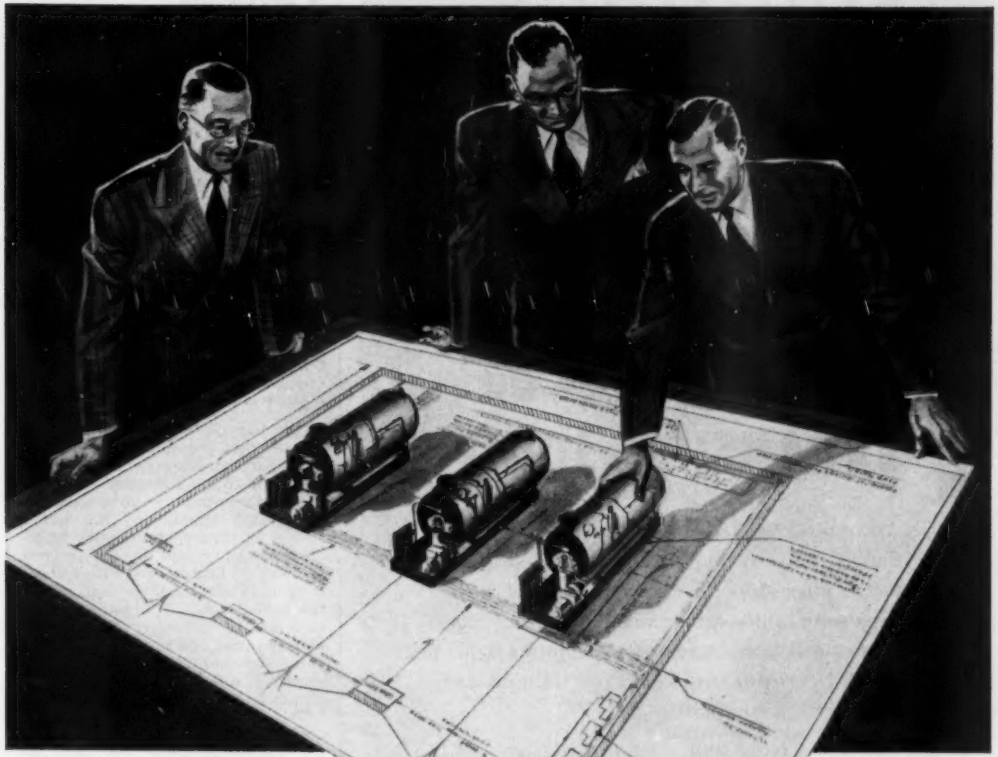
Water System for High Places

Contributed by Walter J. Prise The Maintenance Company

A special water supply system for washing and cooling the roof of a high building posed a problem because the water tank pressure was insufficient to provide water pressure at the height involved.

A booster pump, actuated by a

Plan Your Boiler Installation this Way..



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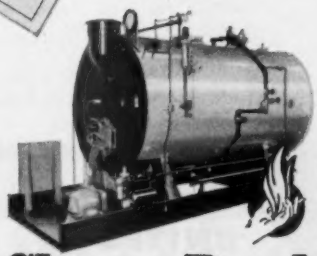

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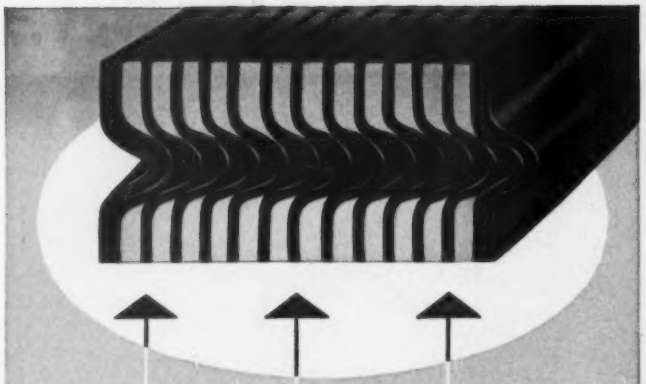

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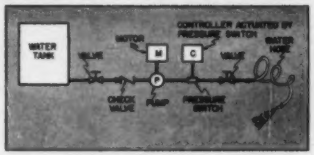
MAINTENANCE & OPERATION

(M and O begins on page 44)

pressure switch, was installed to solve the problem, and the resulting system proved adequate for the job.

The booster pump pressure switch used was located at the discharge of the pump. With the outlet valve



Schematic diagram of pump and pressure switch system illustrates relation of pump pressure to water flow demands

in the line closed, the pump builds up sufficient pressure in the line to trigger the pressure switch, and stop the pump. When the valve is opened the resulting pressure drop actuates the switch again, and the pump starts, to supply water with sufficient pressure and in the desired volume, as long as the outlet valve is open. When water demand ceases the outlet valve is closed, and as soon as the difference in pressure between inlet and outlet ends of the pump reaches preset limits, the pressure differential actuates the switch to stop the pump.

The system maintains the water supply at the desired pressure, with the volume required, and yet the pump operation is intermittent.

Air Power Unloads Waste Cart

IN MANY PLANTS, waste material is collected in hand carts which are then emptied into packer trucks. Conventionally, these carts are

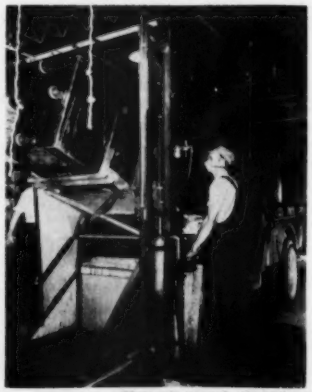
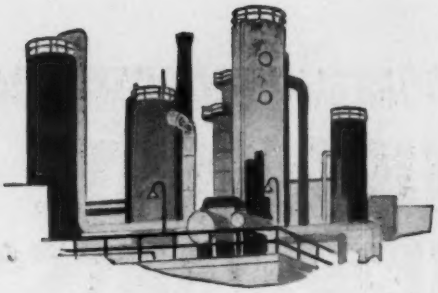


Photo: Compressed Air Institute

Workman controls the air piston which has overturned the cart for unloading



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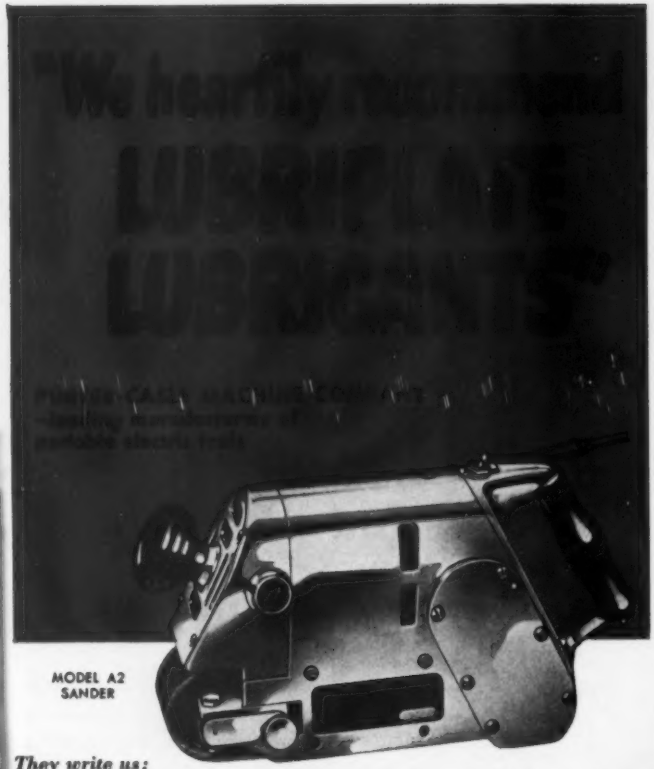

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MAINTENANCE & OPERATION

(M and O begins on page 44)

wheeled out onto a loading platform and dumped into the waiting trucks.

This procedure has been changed at the Burroughs Adding Machine Co., Detroit, Michigan, eliminating the need of a loading platform.

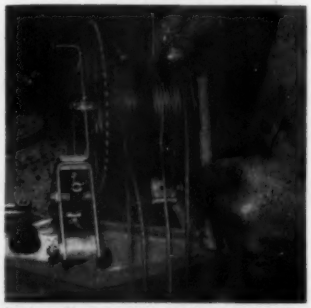
A sleeve has been welded to each side of a waste cart. A welded structure has been erected on the plant floor. Two arms of this welded structure slip into the sleeves of the cart which is guided into a stable-like entry.

A double-acting cylinder acts on a cable which passes over a pulley. The arrangement is such that it upends the cart when the air piston is on the down stroke. On the return stroke, the cart is returned gently to the floor.

This simple air-actuated device might conceivably be adapted to other material handling problems facing plant engineers.

Clips Hold Cables on Drums

SPRING STEEL CLIPS and a holding fixture make it possible for one man to wrap control cables on cable drums, at the Temco Aircraft Corp., Dallas, Texas.



Spring clips placed over drum hold cable in place as operator starts new cable

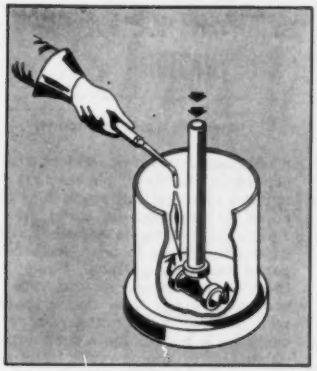
Using the method devised, the steel clips are pushed over the drums after each cable is wound in place, to hold it while the next cable is wound. Various sizes and widths of clips make them usable on many drum-wrapping operations.

Ventilation for Inside Burning

Contributed by William Steindl

IN WELDING or preheating inside a tube or hollow vessel, considerable difficulty is caused by lack of air around the torch, and blowbacks frequently occur.

This condition can be eliminated by the insertion of a pipe tee in the



Pipe tee placed inside hollow vessel becomes outlet of air circulation stack

bottom of the vessel with a length of pipe extending out of the vessel. This acts as a "stack" and provides the circulation of air necessary to sustain the flame and prevent blow-back of the torch.

Inside Coating Cuts Sheet Metal Elbow Maintenance

Contributed by James McCulloch, Carborundum Company

A SERIOUS maintenance problem was created by air-borne abrasive dust wearing out the sheet metal elbows on dust collector pipes. The elbows, made of 18, 16 and 14 gauge sheet metal, were in some locations being replaced monthly.

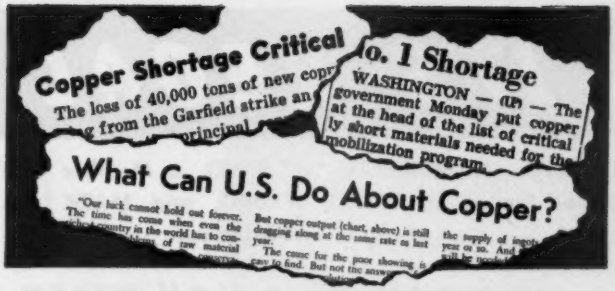
A highly effective procedure in reducing this wear was evolved through coating the inside of the elbows with aluminum oxide grains, using rubber cement as the adhesive bond. Under the severest test, these abrasive coated elbows actually outlasted the uncoated elbows 3 to 1. In some locations, maintenance cost of elbows was cut 50 per cent.

Coating elbows with abrasive is simple and inexpensive. An elbow can be done in minutes, by spreading a light coat of rubber cement inside the elbow and then sprinkling in enough abrasive to cover the cement. It is not necessary to let the cement harden, and the elbow can be installed immediately.

Plastering Problem Answered

SUCCESSFUL plastering over the interior of concrete walls depends largely upon the surface texture of the concrete, according to the Kaiser Gypsum Co. Many concrete walls are poured using steel or plywood forms along with mechanical vibrations resulting in a very smooth and dense surface. Some concrete walls on the other hand have a relatively rough and porous surface.

For successful plastering over concrete, two methods are available. Bonding plaster may be applied to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year.
the supply of
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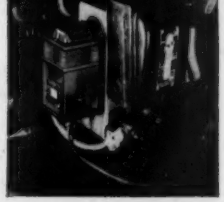

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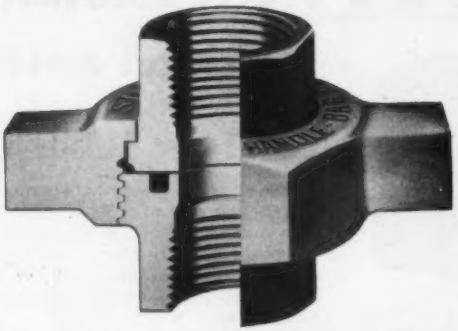

Hand tighten the nut and the pressure from within the line makes the seal with the "O" Ring between the two mating surfaces. The one and only sealing method that does not require brute force to make a tight joint on pressures to 3000 lbs. C.W.P., and temperatures to 212° F. Write for bulletin "O" Ring HB.

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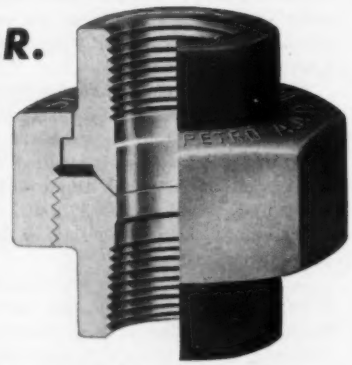

Write department P for new illustrated catalog or refer to listings in Chemical Engineering Catalog pages 1120-1121, Composite Catalog pages 3140-3141 and Refinery Catalog page 653.

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MAINTENANCE & OPERATION

(M and O begins on page 44)

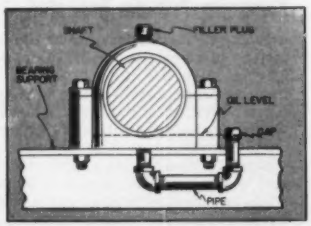
a roughened, clean concrete surface, or, regular hardwall plaster may be applied to metal lath (which is secured to the concrete wall).

Bonding plaster is especially designed to adhere to a properly prepared concrete surface. Since the thermal expansion of concrete is somewhat lower than that of hardwall plaster, the bonding plaster is designed to approximate the thermal expansion of the concrete, thus reducing the possibility of shear during temperature changes. Before plastering, the concrete surface must be cleaned of all oil from the forms, dust, etc., and be sufficiently rough to allow the crystalline structure of the plaster to interlace into the pores of the concrete to form a good bond. A smooth concrete wall can be roughened by bush hammering or by applying a dash coat of portland cement grout before plastering. The total thickness of the bonding plaster on concrete walls should not exceed one-half inch and on ceilings the thickness should be between one-eighth and three-eighths inch.

Regular hardwall plaster can be used over metal lath when the concrete walls are left smooth. In some areas, concrete walls are coated on the interior with bituminous waterproofing compound. Such treatments kill the suction of the concrete and provide a surface to which gypsum plaster will apparently bond at first—but after a period of time the bituminous material is oxidized or otherwise altered and the plaster bond severely weakened. When such waterproofing compounds are used, it is strongly recommended that metal lath be attached as a plastering base for regular hardwall plaster.

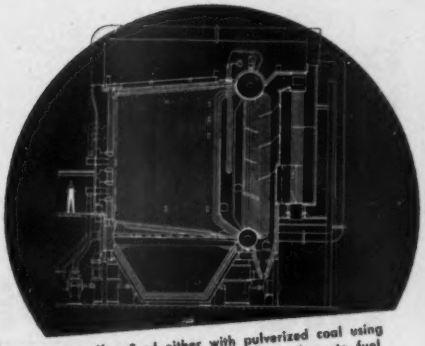
Either of these two methods may be used with success, and in the case of new construction, the condition of the concrete subsurface can be pre-chosen to suit the preferred plastering method.

Oil Level Indicator

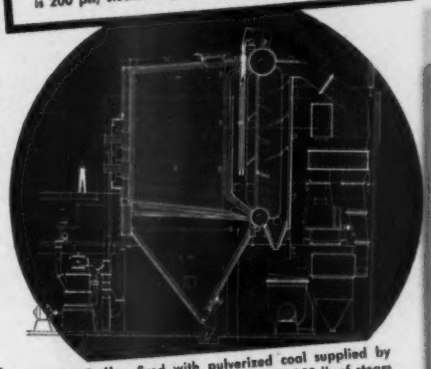


Piping arrangement aids in filling ring-oiled bearing housings when top of outside nipple is set at prescribed oil level

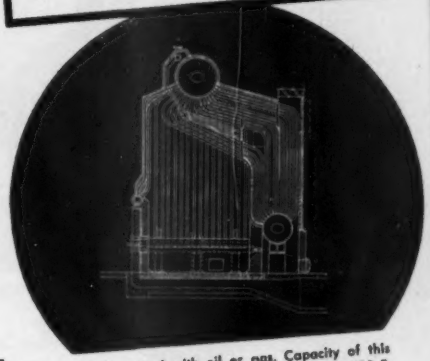
Leaders in every Industry choose VU



VU-50 Boiler fired either with pulverized coal using C-E Raymond Bowl Mills, or oil as an alternate fuel. Capacity is 100,000 lb of steam per hr. Steam pressure is 200 psi; steam temperature is 500 F.



VU-50 Boiler fired with pulverized coal supplied by C-E Raymond Bowl Mills. Capacity — 150,000 lb of steam per hr; steam pressure, 600 psi — temperature, 700 F.



VU-10 Boiler fired with oil or gas. Capacity of this unit is 40,000 lb of steam per hr at 420 psi and 600 F. VU-10 capacities range from 10,000 to 60,000 lb of steam per hr. They may also be fired by spreader, underfeed or chain grate stokers.

More and more . . . in industry after industry . . . you will find C-E Vertical-Unit Boilers (Type VU) establishing the standards for efficient steam production.

In Textile Mills, for example . . . where steam must be reliably available for process work . . . many of the industry's leaders, as evidenced by the representative list below, are users of Type VU Boilers.

Why list only large companies when VU Boilers are also used by many smaller textile mills? Because such names form a significant guide for a prospective boiler buyer, in the same sense that the buying decisions made by operators of large truck fleets can be a reliable guide for the man who wants to buy a single truck. Moreover, big companies buy boilers frequently . . . therefore their experience is always up to date. And they buy them for plants in many locations, using many different fuels. Thus they have the breadth of experience that is required for making the soundest equipment selections.

So if you need steam — from 10,000 to 350,000 pounds per hour — remember that leading companies in every industry are profiting from the advanced design . . . sound construction . . . reliability . . . of C-E Vertical-Unit Boilers.

Typical Leaders in the Textile Field that have purchased C-E Vertical-Unit Boilers for one or more mills

American Thread Company
American Viscose Company
American Woolen Company, Inc.
Bancroft & Sons Company
Bigelow-Sanford Carpet Company
Burlington Mills Corp.
Cannon Mills Company
Celanese Corporation of America
Cone Mill Corp.
Congoleum-Nairn, Inc.
Dan River Mills
Goodall-Sanford, Inc.
Mohawk Carpet Mills, Inc.
Standard-Coosa-Thatcher Company
Textron, Inc.
West Point Manufacturing Company

COMBUSTION ENGINEERING — SUPERHEATER, INC.

200 Madison Avenue, New York 16, N. Y.

B-572-A

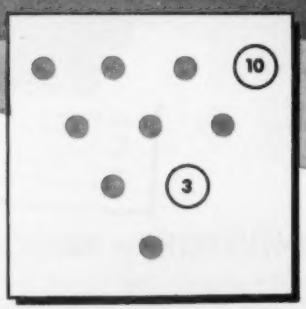
ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS: ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS

EXPERTS AT WORK,
EXPERTS AT PLAY,
ALL AGREE:

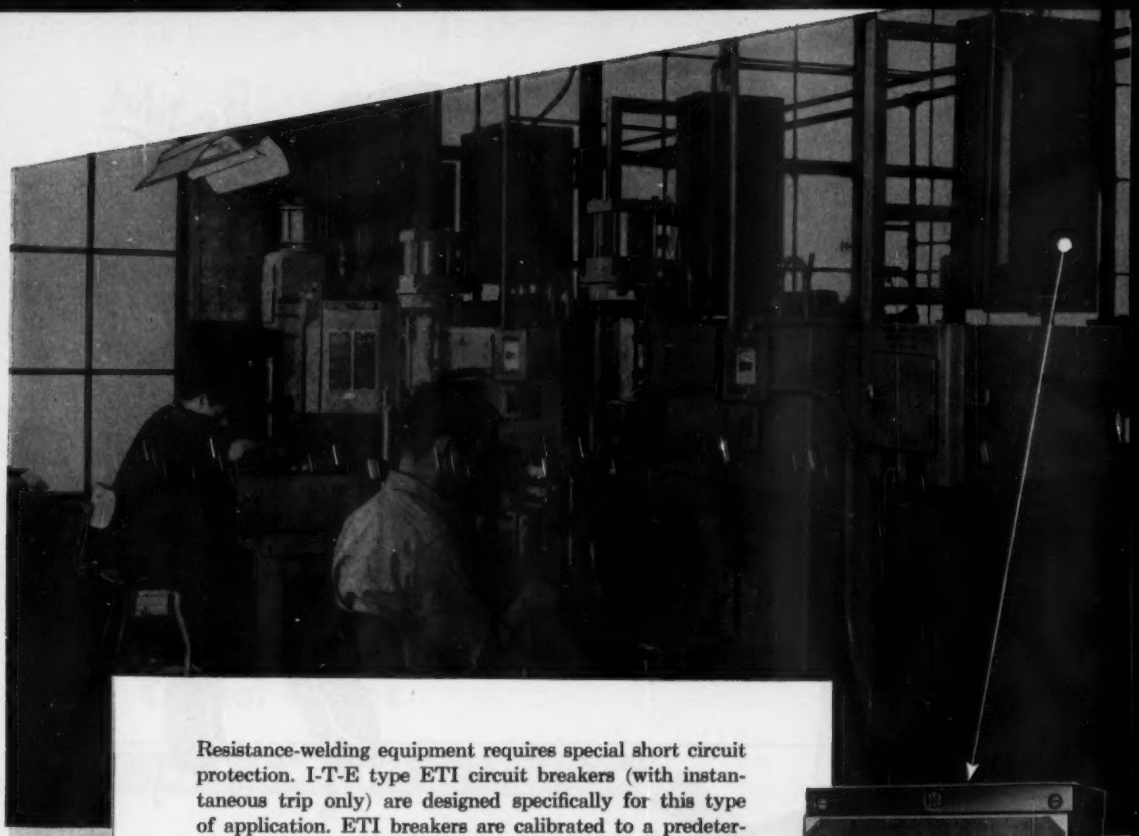
THERE'S ONE BEST WAY!

Bowling experts agree the job of picking up a spare from a 3-10 split is made easy by standing to the left and shooting to the right of the number 3 pin. The control required for the shot is one thing, but knowing *what* to do is the important thing.

Electrical experts agree the job of protecting lighting, power, and distribution circuits is made easy by relying on circuit breakers. But the selection of the correct circuit breaker for the job is the *important* decision.



There are three ways to pick up this spare, but the right way will make the job a lot easier. Do you know it?



Resistance-welding equipment requires special short circuit protection. I-T-E type ETI circuit breakers (with instantaneous trip only) are designed specifically for this type of application. ETI breakers are calibrated to a predetermined range and can be *externally adjusted* to a given point within this range to satisfy the protection requirements of individual welders.

Your decisions on circuit breakers will always be right if you specify I-T-E Molded Case Circuit Breakers. You're sure to select the right circuit breaker if you get expert help from our Bulletin 5108-D. It contains six pages of tables and data on the selection and application of circuit breakers. You'll be right, because no matter which breaker you select, you get an all-important *reserve* protection. Every breaker in the I-T-E line has reserve thermal and mechanical capacity far beyond its requirements. Every breaker will carry full rated load indefinitely. I-T-E Molded Case Circuit Breakers are designed and built by circuit breaker specialists. They are supplied in four frame sizes covering:

10 to 600 amperes • 120 to 600 volts a-c • 125 to 250 volts d-c

When you decide to install I-T-E Molded Case Circuit Breakers—you have decided to get *reserve* protection.

For a complete description of I-T-E Molded Case Circuit Breakers, including selection and application data, write for Bulletin 5108-D. The I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pennsylvania.

I-T-E

MOLDED CASE CIRCUIT BREAKERS

I-T-E CIRCUIT BREAKER CO. • 19th and HAMILTON STS. • PHILADELPHIA 30, PA.

R&IE Equipment Division, Greensburg, Pa. • Canadian Mfg. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., N.Y. 17, N.Y.

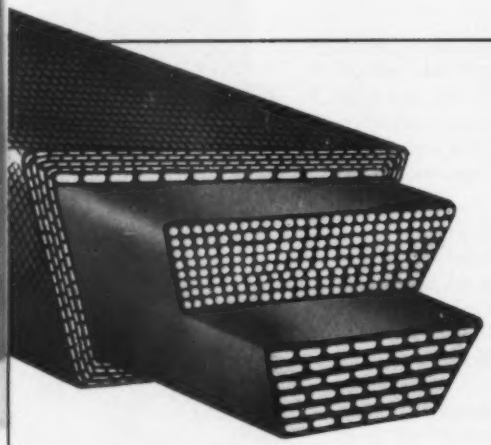
How to get More Life out of V-Belts

(STORAGE)

DON'T store V-Belts in a hot dry room or expose to the direct rays of the sun.

DON'T hang belts in such a way that their shape will be distorted.

DO specify and store *Bull Dog V-Belts* in adequate supply for your normal replacement requirements. With Bull Dogs on the job "normal" replacements are few and far between.



Your BWH distributor will be glad to show you how Bull Dog V-Belts have the covers, the cords and the compounds to cut *your* belting costs. Call him today.

HERE'S WHY

Their DURABLE COVERS withstand the severe wearing action of the sheave while sealing the belt against grease, dirt, moisture.

There's MINIMUM STRETCH due to a new, exclusive technique which results in fewer takeup adjustments, reduced slippage, longer belt life.

There's a STRONG, SPECIALLY ENGINEERED CORD SECTION with high tensile strength, increased load carrying capacity, ability to absorb shock loads.

The belt TAKES HEAVIEST FLEXING because BWH quality-controlled compounds run cooler and do not crack or deteriorate under severe flexing.

BWH
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

TAKE NO CHANCES WITH SLIGHT LEAKAGE

APPLICATION: Where even slight leakage of a flowing medium might become obnoxious, dangerous or excessively expensive.

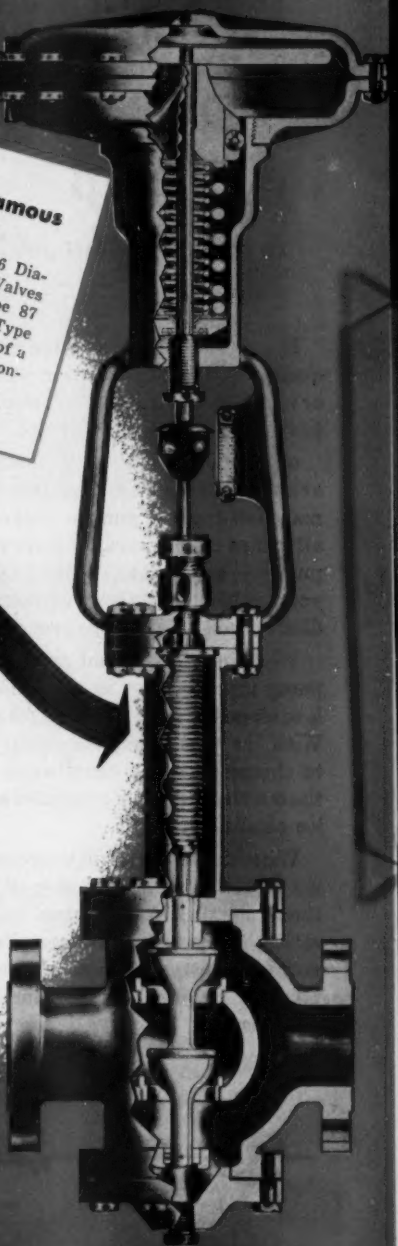
Specify

BS&B CLIMAX

Type 87 Diaphragm Control Valves

From The Famous Family

of Climax Type 86 Diaphragm Control Valves . . . the NEW Type 87 . . . identical to the Type 86 except for the use of a bellows seal plus a conventional stuffing box.



. . . with bellows sealed stem

Constantly striving to improve an already satisfactory item—that's part of the BS&B policy, part of our way of doing business. For example, take BS&B Climax Type 86 Diaphragm Control Valves of which the Type 87 is a family member. All Climax Type 87 valve bodies are designed to conform to I. S. A. tentative face-to-face standards. New designs continue to feature BS&B's interchangeability-of-parts advantage for greater operating and maintenance economy.

Type 87 is manufactured for all services and in all materials that are contemplated by Type 86 and in sizes from ½" to 6". Bellows can be supplied in bronze, stainless steel, Monel, Hastelloy "B", Nickel or other special alloys suitable. Maximum working pressure 400 lbs. cwp. The conventional teflon packed stuffing box is installed at the point the valve stem passes out of the bellows casing to forestall any appreciable loss of flowing medium in case of bellows failure.

Ask your BS&B MAN...33 Branches...13 Sales Offices...Ask for New Climax Catalog Section 105—recently revised—or write Black, Sivalls & Bryson, a leader for 60 years in oil and gas producing and refining equipment...out in front with controls and equipment for the processing industries.

CLIMAX BS&B CONTROLS

BLACK, SIVALLS & BRYSON, INC.

Climax Controls Division, Dept. 4-P7

7500 East 12th St. Kansas City 3, Missouri

How do you know which

Positive Displacement Pump

is right for your job?

If you've ever suffered the consequences of a wrong choice in pumps, or if you're now making a choice and have some doubts, here's help.

GET THE ADVICE OF A PUMPING SPECIALIST—a manufacturer who makes *all* types of pumps—including all types of positive displacement pumps—and is in a position to treat your problem objectively without the desire to sell you one type over others.

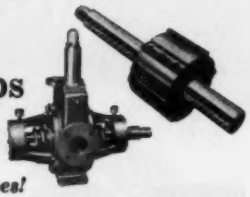
Worthington — oldest and largest pump manufacturer in the world — is equipped to do exactly this for you. With the most complete pump line to choose from, we can always find the one that fits your particular service conditions.

Write and tell us about your pumping problems. Be sure to give all pertinent details! Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.

The Worthington Positive Displacement Pump Line includes all these . . .

1. Rotary Pumps

Both gear and vane types!

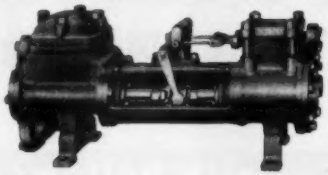


FOR VISCOUS LIQUIDS—SMOOTH, QUIET OPERATION. *Worthington Herringbone-Gear Pumps*, Types GA and GR; capacities from 1 to 5,000 gpm; pressures to 500 psi.

FOR NON-LUBRICATING, SLIGHTLY ABRASIVE OR CORROSIVE LIQUIDS. *Worthington Sliding-Vane Pumps*, Types VE and VR; external or internal bearings; capacities from 25 to 1,000 gpm; pressures to 200 psi.

2. Steam Pumps

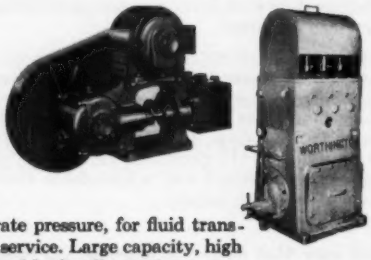
If you use steam, why not drive pumps with it?



Steam ends up to 250 psi maximum working pressure, hydrostatically tested to 375 psi. Hot-oil or cold-oil fitted. Simplex and duplex. All types: large and small; low pressure, high pressure; for general, boiler feed, refinery, steam heating and evaporator service.

3. Power Pumps

Up to 2,000 hp!



Small capacity, moderate pressure, for fluid transfer, refinery or general service. Large capacity, high pressure, for pipeline and hydraulic service.

P.2.7

The World's Broadest Line Assures You the Right Pump for Every Job

WORTHINGTON

Reciprocating and Rotary Pumps

ADSCO TECHNICAL BULLETINS

3 NEW BOOKS JUST PUBLISHED SEND FOR YOUR COPIES *TODAY!*

● Adsco's three new bulletins—one on Corruflex Packless Expansion Joints, one on Instantaneous Heaters, and one on Convertors—are the most authoritative in the industry. These new bulletins will provide ready information you will always need. *Here they are:*

1. CORRUFLEX . . . 28 pages with complete information on selection, specifications, and installation; 9 pages of tables on weights and dimensions. Drawings of 3 typical piping arrangements; 29 drawings of basic joints and their variations.

2. INSTANTANEOUS HEATERS . . . 56 pages, with 49 pages of tables. Capacities and pressure drops for 198 heaters at 9 steam pressures and 12 temperature ranges. Special information and tables on coolers and on booster, swimming pool and other types of heaters.

3. CONVERTORS . . . 32 pages, with 24 pages of tables. Capacities and pressure drops for 148 convertors at 7 steam pressures and 15 temperature ranges. Detailed instructions on how to select a convertor. Special charts and information on problems related to convertors.

ADSCO
75 YEARS OF LEADERSHIP

MAIL THIS COUPON TODAY!

AMERICAN DISTRICT STEAM COMPANY, INC. Dept. PE-7
North Tonawanda, N. Y.

Please send me the bulletins checked:

- ☐ Corruflex Packless Expansion Joints
- ☐ Instantaneous Heaters
- ☐ Convertors

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

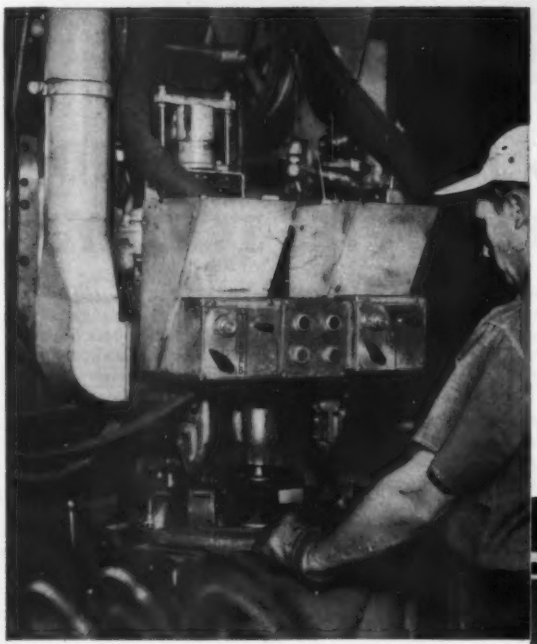
THE INVISIBLE TOOL

at work in the

FORD AUTOMATIC TRANSMISSION PLANT

NUMBER 3 OF A SERIES

KIRK AND BLUM SYSTEMS CONTROL FUMES IN WELDING



Automatic arc welding machine used to assemble center pilot to the fly wheel disc of the automatic transmission. Fumes are removed below the breathing level of the operator.

All types of fume-making operations in this large plant are controlled by a number of KIRK & BLUM Systems. Each was designed to do its specific job with utmost efficiency. Here, welding machines are exhausted, keeping smoke and fumes from the plant air.

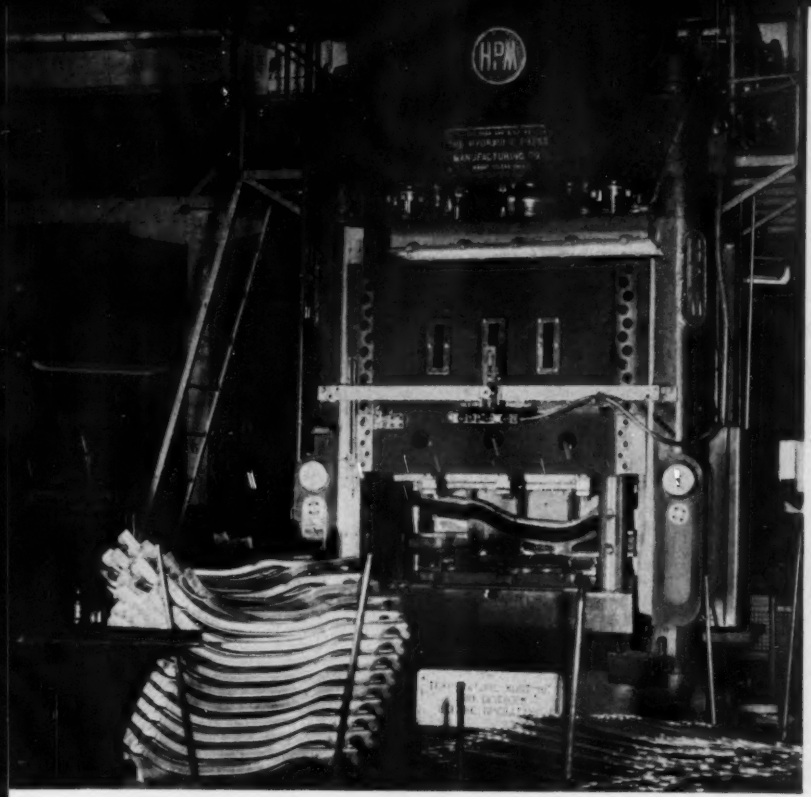
In the ultra-modern Ford Motor Company Automatic Transmission Plant, 37 distinct KIRK & BLUM Systems aid in the production of Merc-o-Matic and Ford-o-Matic transmissions. In heat treating, quenching, welding, cleaning, machining, woodworking, maintenance and assembly operations, they provide "Clean Air . . . the INVISIBLE Tool" in this model plant.

Let the experience of KIRK & BLUM engineers work for you. Write for free literature. The Kirk & Blum Manufacturing Co., 3189 Forrer St., Cincinnati 9, Ohio.

Induction welding machine used to assemble a ring gear to the fly wheel disc. Here a complete hood is used and fumes are collected above the operator's head.

KIRK AND BLUM

FUME CONTROL SYSTEMS



Send for this booklet...

Gain these benefits for your hydraulic operations

THE BIG 400-ton hydraulic press shown above is used to stamp out parts for farm machinery in a big midwest plant.

When the press was first put into operation, plant operators followed the recommendation of a Standard Oil lubrication specialist and used STANOIL Industrial Oil in the hydraulic system. In over four years of continuous hard service, there has been no lost time because of inefficient performance of the hydraulic oil.

Oil capacity of the system is approximately 9 barrels; only 2 barrels make-up per year has been required. The oil in this system has never been changed. It has been centrifuged once to remove moisture which accumulated over three years' operation. Periodic tests of oil samples have shown that STANOIL Industrial Oil has maintained its high lubricating quality. A recent analysis showed no increase in viscosity of the oil, no change in color, and a neutralization number of only 0.13 mg. KOH/gm.

STANOIL
TRADE MARK
Industrial Oil

You can rely on this unique many-purpose oil to give you the same clean, dependable service. Get the expert help of a Standard Oil lubrication specialist by phoning your local Standard Oil office.

Or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

See what Stanoil offers you...

You'll find the means to significant savings in this booklet. It describes the important qualities of STANOIL Industrial Oil and the resultant benefits which have made this multi-purpose oil the choice of midwest manufacturers for a host of important lubricating jobs. Discover how STANOIL will give you superior protection through its unique combination of six outstanding characteristics, including high stability and effective rust prevention. Find how STANOIL can simplify stock, storage, and inventory in your plant by replacing special-purpose oils in hydraulic systems, speed reducers, air compressors, machine tools, electric motors, auxiliary turbines, and a wide variety of circulating, bath, and bearing systems. Ask the Standard Oil lubrication specialist from your nearby Standard Oil office for this booklet, or write: Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago.

STANDARD OIL COMPANY STANDARD *(Indiana)*

Why pay bills like this

Industrial Painting Contractors

16712 LAVERNE AVENUE - CLEVELAND 11, OHIO

June 1

STATEMENT

For Window Painting for typical factory

Labor	2,100 00
Material (Paint)	700 00
Overhead	525 00
(Scaffolding Ladders Brushes Drop Cloths Insurance Cartage)	
Profit	280 00
Total	$3,605 00

When you can do this

INTEROFFICE CORRESPONDENCE

TO W. T. Benson FROM R. C. Hudson

RE: New Madison Plant

Bill:

Just saw an ad on Fenestra Super Hot-Dip Galvanized Steel Windows. Look like the kind of windows we need for the new plant. They're steel, so you know they're really rugged, and the ad says they're galvanized by a special system so they are super protected from rust. That will save our maintenance department a lot of money every year. Ad also says write to Detroit Steel Products Company, Dept. I.C., Detroit 11, Michigan for complete information and a special free book on the Fenestra Galvanizing System.

Check on it right away, will you?

Thanks.

Dick

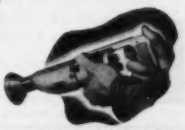
NOW! Do your construction fastening up to 100 times faster with REMINGTON STUD DRIVER ... and do it safely!

This revolutionary tool attaches steel or wood structural pieces to concrete or steel surfaces in seconds ... cuts costs and working time on construction jobs. Completely self-powered, the Stud Driver sets as high as 5 studs per minute ... with no outside power source or other equipment required. Studs have pull-out resistance as high as two tons!

Test-proved to be the world's finest and speediest fastening system, the Model 450 Remington Stud Driver is made by Remington Arms Company, Inc., *America's oldest and foremost sporting arms manufacturer*. Price for Model 450, complete in rugged steel carrying case—only $119.50. To obtain detailed information on this time and money-saving tool, and for the name of your nearest distributor, fill out and mail the coupon below.

It's fast, easy and safe to operate the Remington Stud Driver

Simply hand-assemble stud and power cartridge, load as a unit in easy-to-open Remington Stud Driver, and close.



Press loaded Stud Driver firmly against surface, depress safety lever and pull trigger. Explosive charge imbeds stud solidly.

Speeds all these jobs . . . and many more!

1. Fastening wood sleepers to concrete or steel.
2. Hanging steel sash and door bucks to concrete.
3. Anchoring stadium and theatre seats to concrete.
4. Fastening wood furring strips to concrete walls and ceilings for attachment of metal lath.
5. Anchoring wood plates to concrete slabs.
6. Hanging radiator housings to steel or concrete.

"If It's Remington—It's Right!"

Remington DU PONT

Remington Arms Company, Inc.
Industrial Sales Division, Dept. PE-7
939 Barnum Ave., Bridgeport 2, Connecticut

I am interested in obtaining detailed information on the Model 450 Remington Stud Driver.

*Name*_____

*Firm*_____

*Position*_____

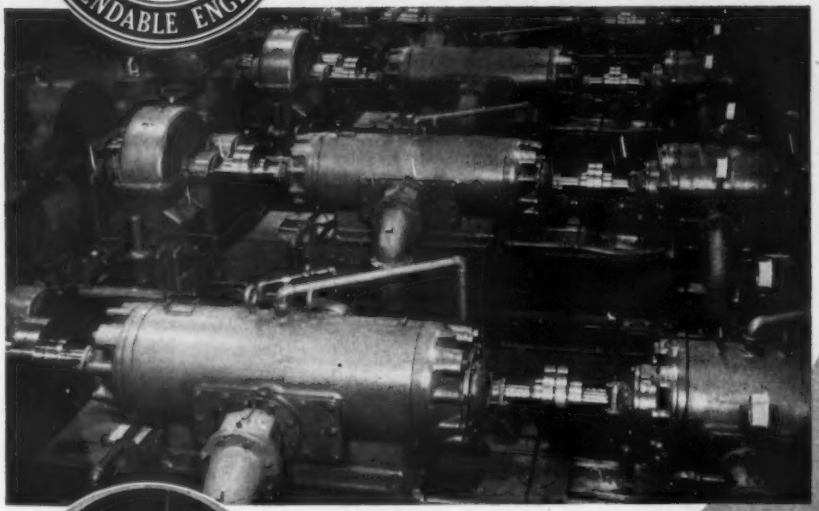
*Address*_____

*City*_____ *State*_____

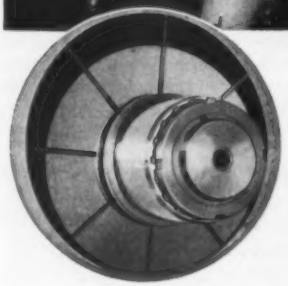
PRATT & WHITNEY AIRCRAFT

DEPENDABLE ENGINES

PRATT & WHITNEY AIRCRAFT



Four Fuller Rotary Compressors, Elliott steam-turbine driven, have a total capacity of 6760 c.f.m., at 110 p.s.i.



depends on FULLER AIRPOWER

Four Fuller Rotary Two-stage Compressors put Pratt & Whitney Aircraft's engine plant in East Hartford on a 100 p.s.i. air diet for such operations as shot peening, spray booths, air cleaning, and air-operated chucks.

Pratt & Whitney Aircraft has joined no *small* family of users; food and chemical plants, steel mills and cement mills, gas-gathering plants, refineries, automobile plants, foundries and machine shops, public utilities, and many others depend on Fuller for compressor equipment, wherever air is required.

Whether *your* air-plans call for single-stage, two-stage — single-stage duplex or two-stage duplex—you can be sure Fuller has the compressors which gives you a dependable source of pulsation-free air up to 3300 c.f.m., 125 p.s.i., with maintained capacity for the life of the machine.

Write for Bulletin C-6, Fuller Rotary Compressors.

FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

Fuller

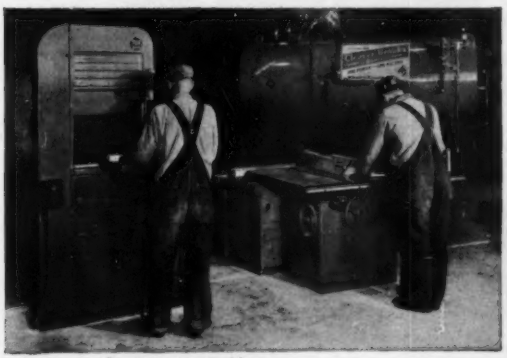
PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

C-225
1624

HOW three companies whip crating and maintenance costs by using DELTA TOOLS

Delta 12" Tilting Arbor Saw Has Needed No Maintenance . . . at Crompton & Knowles Loomworks, Worcester, Massachusetts

Each power loom built for export shipment presents an individual crating problem; and the "hub" of that major wood-cutting operation is a Delta 12-inch tilting arbor saw. It rips random-width lumber to proper sizes for the individual crates. The main body of each loom reaches the crating shop bolted to a wooden frame, exactly as it will be bolted to the floor later on. It is then braced to prevent shifting, and a box is built up around it. This is covered with moisture-resistant paper, and the outer box is then formed. *The Delta saw has been in use well over four years; maintenance—none.*



Delta Saws Solve A Crating Problem . . . for Cleaver-Brooks Company, Milwaukee, Wisconsin

Problem: Steam boilers—massive yet delicate equipment, ranging from 15 to 500 HP and up to more than 40,000 pounds—are subjected to excessive jolting and to long exposure to elements during transit by rail and overseas. Costs of crating to provide complete protection were extremely high . . . **Solution:** Working from blueprints and precutting by two Delta saws—a 12" tilting arbor saw to cross-cut, rip and miter-cut lumber from crating boilers of various sizes, and a 20" band saw to cut inner bracing and support members.
Result: *An immediate big slash in crating costs.*

Delta Radial Saw Has Paid for Itself Many Times . . . for California Valencia Juice Co., Chicago, Illinois

"Our Delta radial saw cuts to length, rips, miters and double-miters the oak lumber used for partitions, sliding doors, work benches, cabinets, docks, and many other items. Using our own unskilled help, it takes less than the time needed to explain jobs to a carpenter," says Elmo Delgrano, owner. "We built hundreds of pallets for handling multi-case unit loads; 60" x 30" bottle trays; and 64" x 34" four-wheel trucks at $20 each for which we'd have to pay at least $60. *The saw costs $1.70 an hour to operate (including labor), has saved us countless hours, and has paid for itself many times over."*

Another Rockwell Product

There's a Delta Power Tool for Your Job-

WOOD OR METAL WORKING

53 Machines • 246 Models • More Than 1300 Accessories

DELTA POWER TOOL DIVISION

DELTA MILWAUKEE Rockwell

MANUFACTURING COMPANY

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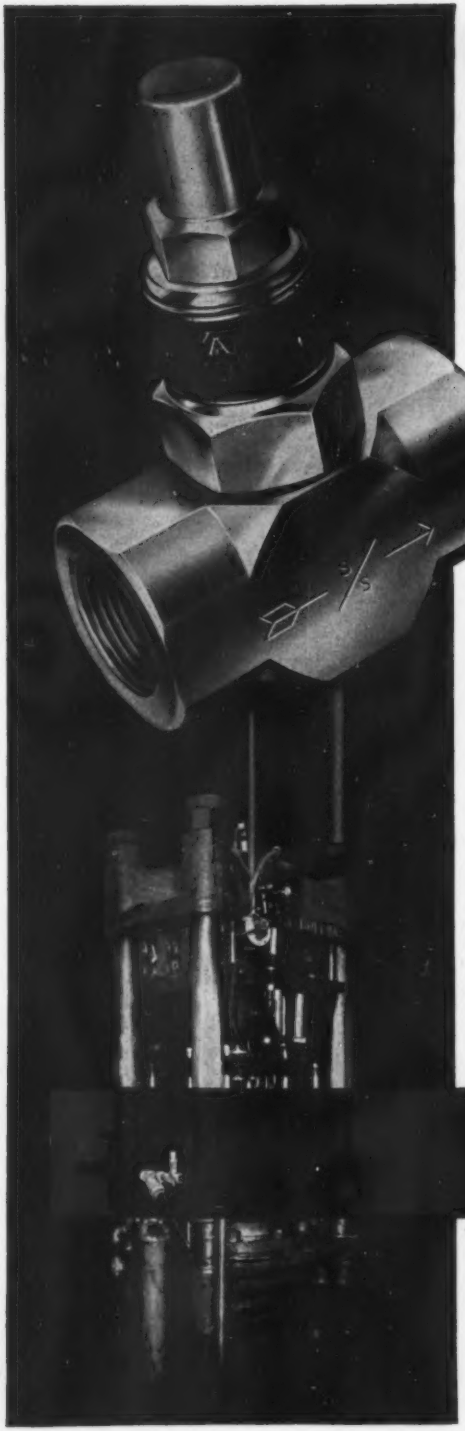

PLASTIC goes to press FASTER

"The use of Yarway Impulse Steam Traps on our platen presses has speeded up our production rates to such an extent that it almost appears we have developed an entirely new process."

That's the Chief Engineer of a large Michigan plastics fabricating plant speaking . . . and he backs up his words by standardizing on Yarways throughout the plant three months after making a trial installation.

You may be surprised at how much faster your product can be produced when Yarways trap your steam equipment. Yarway Impulse traps are designed with production in mind. They insure sending maximum B.T.U.'s at top temperature into your process or product. They get equipment hotter, *sooner* . . . and keep it hot!

Yarway Impulse traps are small, easily installed, good for all pressures, made of stainless steel, require minimum maintenance, cost little.

Try Yarway Impulse traps yourself. Stocked and *sold* by 216 Industrial Distributors. For steam trap advice, call your nearby Yarway trap engineer.

the steam trap designed with more production in mind

YARNALL-WARING COMPANY
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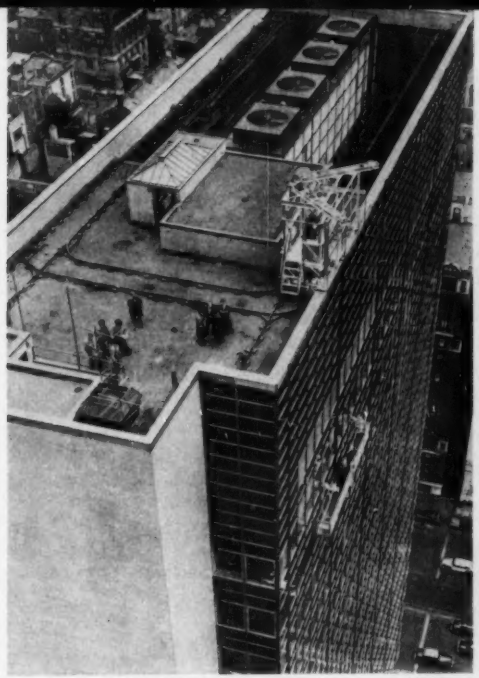


Bird's-eye view of the equipment with the platform in position at the side of the building. The portable power unit runs completely around building top perimeter on the tracks

The long platform is lowered down the sides of the building on special tracks which prevent the gondola swinging and swaying outward, away from the sides of the building

Soap Company Bathes Mechanically

LEVER HOUSE, new home of Lever Brothers Company, besides being an unusual building, holds another singular distinction. It is the only building in the world that is washed twice a month on the entire outside.

When Lever Brothers' new headquarters was in the planning stage, the problem of washing all 1,404 windows was studied for six months. A survey showed that sealed windows would mean a substantial saving in original cost, an annual saving in interior and exterior cleaning, and a further saving in heating and air conditioning.

The machine finally developed for the window-washing job is composed of two parts, a power plant car that moves around the roof on railroad tracks, and a gondola or platform that is lowered down the side of the building.

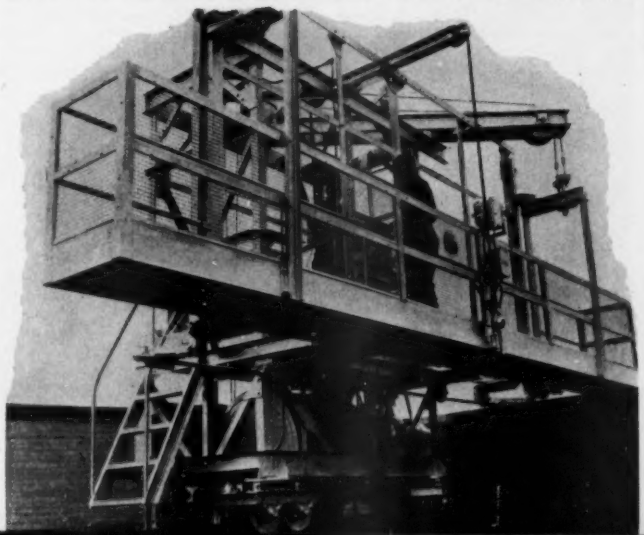
The whole window washing machine is electrically operated. Push buttons move the power plant to a section of windows and two men climb into the gondola. By pushing another button, they lower the gondola down the side of Lever House, stopping at each floor level to wash the windows.

The two men can clean the entire building in six days, a job that would normally take a whole crew of men two weeks.

The gondola is connected by cables to long arms on the power plant car which extends over the edge. Vertical tracks on the building prevent the gondola from swinging away from the side of the building.

The power plant car weighs 10½ tons and moves around the roof at a speed of 25 fpm. The gondola is 28 ft long, 2½ ft wide, with a 3-ft guard rail and has a capacity of 1500 lb. It moves up and down the side of Lever House at a speed of 35 fpm. Gondola and car are stored out-of-sight when not in use.

Close-up of the equipment which enables two men to wash the entire twenty-four floor exterior of Lever House in six days. A strip of six windows and a corresponding width of building wall are washed at one trip—with Surf, of course



Crusher V-belt drive serving as a buffer between the driving motor and driven shaft

V-belts can accomplish many things in industrial drives . . . Cushion shock of heavy loads, protect motors, eliminate backlash . . . High torque requirements can often be met by use of V-belts

By E. A. GAHL, Texrope Drive Department
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

BACK IN 1910, skeptics regarded the automobile as an upstart contraption with practically no chance for enduring success. In 1925, the V-belt drive was contemplated by many in a similar dubious manner.

Yet both of these products have vindicated the confidence of their originators during the intervening years, and the reason for their present general acceptance is not hard to understand.

In the case of the V-belt drive, its use has converted shops with machines powered by overhead line shaft drives—many of them operated by a single large motor—to the modern plant with the direct V-belt drive.

Besides eliminating hazardous conditions prevalent during the days of overhead line shaft drives, such as overhead bearings which dripped oil and belts which obstructed light, the V-belt drive offers the advantages of versatility and often eliminates the need for a clutch.

This latter is true particularly in instances where heavy starting characteristics prevail. Because the V-belt drive "cushions" the shock of a heavy load, it protects the motor and permits the load to move without jerking. Then, too, it eliminates the possibility of backlash, another major cause of motor strain.

In general, heavy starting loads call for high torque requirements in the motor. These add to the original price of the machine. By using a standard motor with V-belt drive on such equipment as pug mills, crushers, beaters, etc., the additional cost of a high torque motor can be eliminated.

For example, by employing a V-belt drive with a clutch on the driven sheave, it was possible for an Ohio brick plant to use a standard cage motor instead of a high torque machine to start the heavy load. In this installation, Fig. 1, the extrusion type pug mill is driven by a standard 150-hp, 690-rpm cage motor, and the shock of heavy starting as well as the impact of peak loads is absorbed and cushioned by the V-belt drive.

Again, in the case of a wood chipper driven by a slip-ring motor, a V-belt drive aids in cushioning the shock of heavy starting and the impact of peak loads. Use of a V-belt here is preferable to a flat belt since where the latter is employed there is a tendency for the belt to be thrown off due to the fluctuating load.

Although V-belts are self-cleaning, it is recommended that where there is danger of stones or debris falling into the grooves, the drive be

VERSATILE
is the Name
for V-Belts

enclosed. However, such an enclosure should not eliminate the normal flow of air or it may result in overheating.

Another advantage of the V-belt drive, as previously stated, is its versatility. There is now and always will be the need for various speeds for different operations. A crusher does not operate at the same speed as a fan, a pump or a compressor. And a belted drive with a standard motor can be the answer to getting the proper speed economically.

To obtain the right speed by means of a V-belt drive is comparatively simple. Practical ratios between driver and driven shafts are easy to determine and where once established for given applications, it is not difficult to obtain the required sheaves from stock.

By using a 1750,- 1160- or 865-rpm motor (these are normal speeds for ac current which is generally used today), it is possible to select a speed ratio suitable for almost any type of machine because the machines are seldom driven at exact motor speeds.

A punch press, for example, requires slow speeds, such as 250 rpm at the flywheel. Thus, a motor speed of 865 rpm cannot be directly coupled to the press and a ratio drive must be used. Dividing 865 by 250, we find that a ratio of 3.46 is needed. Consequently, a driver and a driven sheave with a ratio of 3.46 must be used.

If this press has a 36-in. diameter flywheel, this diameter is divided by 3.46 (the ratio) to get the diameter of the motor sheave, which in this case is 10.4 in. If the diameter of the flywheel is 45 in., then that divided by 3.46 would result in a figure of 13 in., the diameter of the motor sheave.

Where a speed change is required when using a standard sheave, that is, to drive the driven machine slower or faster, it can be quickly and easily obtained by merely changing the sheave.

Another means of securing change in speed is by variable diameter V-belt sheaves and speed changers Although two- and four-speed motors do a good job, they are expensive and their speeds are limited. An economical alternative is the variable V-belt drive which is able to provide a speed range up to 375 per cent. Such a drive would make it possible to vary at will all speeds of an 1160- or 1760-rpm standard stock motor with full load speed coupled through a speed changer unit. Thus, a pump could be operated at 500 rpm to 1875 rpm or a punch press varied from 100 to 375 rpm.

Variable speeds are essential in countless installations. One of the most common requirements is on ventilating fans and blowers. Synchronizing fan speeds for balancing ventilating systems to meet winter

Fig. 1. This extrusion type pug mill is subject to heavy duty. V-belt drive cushions the shock of the load and makes possible use of a much lower-cost motor

or summer requirements is accomplished easily and quickly by means of a variable speed drive used with a standard motor.

A speed range is often essential when pump loads vary. A change in head loads may require a higher pump speed to do the job. By using the variable speed drive, just a simple turn of a crank or operation of a push button can bring about the required change. Sewage plants require that type of adjustment daily as higher and lower speeds depend upon a fluctuating water level and automatic floats actuate pilot motors to control pump speeds to suit the variable requirements.

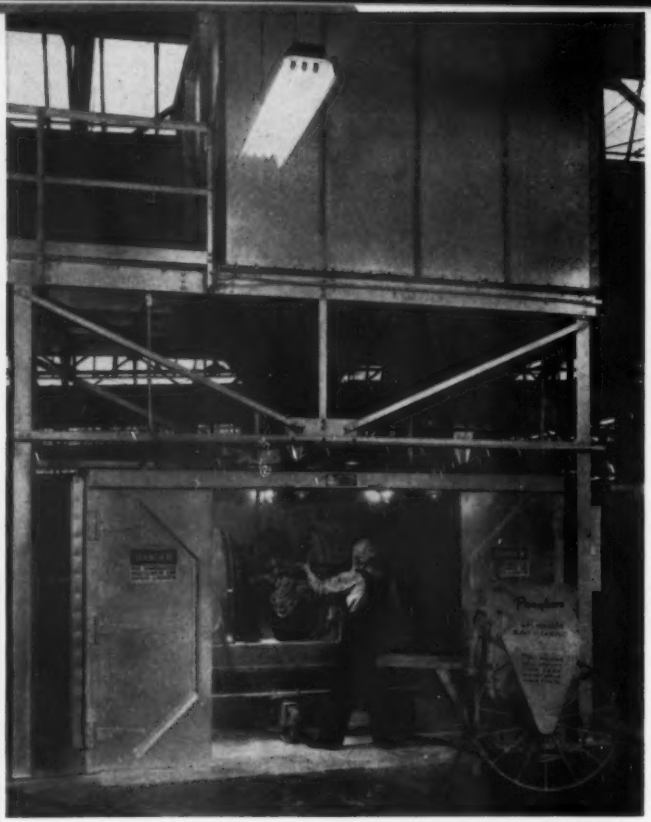
Coal washing pumps handling solids to stock piles, gondola cars or boats require variable speeds and constant changes due to load variations in the pump and piping. Similar units used for pumping gravel, sand, iron ore, pulp, etc., have variable speed requirements which are satisfactorily met by means of V-belt variable speed drives and speed changers.

Production can often be controlled through use of variable speeds. For example, a punch press cutting 8-in. diameter discs at 20 per minute, can increase the quantity when cutting smaller discs by changing the driver sheave. Such an adjustment could speed up the production of 5-in. diameter discs to 30 per minute or 3-in. diameter discs to 40 per minute.

On grinding wheels, the savings through use of V-belt variable speed drives soon pays for the original investment. A 30-in. diameter wheel must operate at 1200 rpm to maintain a speed of 9500 fpm. As the wheel wears down, its speed must be increased to maintain its original efficiency. When the wheel is re-

(Continued on page 170)

Fig. 2. This variable speed drive used with a standard motor has proven a popular, economical and dependable method of operating induced draft fan



The reasons why corn cob grits and hardwood sawdust have been found to be tops in the blast cleaning department . . . Equipment used and how it is arranged

Fig. 1. One of the first complete corn cob blasting installations is this one at the Riverdale plant of Acme Steel

MAINTENANCE BLAST CLEANING

With Corn Cob Grits and Sawdust

By **FRANK NEWELL, Development Engineer, Pangborn Corporation**

ALTHOUGH EQUIPMENT has been available for many years for blast cleaning with soft grits, such as peach pits, walnut shells, pecan shells, plastic pellets, cherry pits, process wheat, austrian peas, apricot pits, the recent development of a machine specially designed to handle corn cob grits and hardwood sawdust now offers new advantages in the maintenance blast cleaning of electrical and mechanical equipment.

When used with corn cob grits, this machine, designated as an AC-4 portable soft abrasive blast cleaning machine, quickly and efficiently removes grease, oil, mud, carbon, copper dust, sand and grit from electrical equipment without destroying insulation or wiring. When used with hardwood sawdust, it removes grease, oil, mud, rust, and loose paint from mechanical equipment quickly and at low cost.

Thus, this equipment is finding wide use in the cleaning of motors, generators, electrical contacts, switches, insulators, instrument panels, industrial batteries and other electrical equipment where abrasive action would cause serious damage to insulation and wiring. Reason: corn cob grits clean with an absorbent, wiping action.

Using hardwood sawdust, the unit offers a fast, economical method for cleaning overhead cranes, unit heaters, gas and diesel engines, compressors, lathes, milling machines, fork trucks, elevator mechanisms, wire-drawing machines, food-processing equipment, packaging machinery, and loose paint from ceilings and internal and external walls.

In effect, this new soft-grit machinery can be used in place of a steam jenny for the cleaning and degreasing of mechanical parts where these parts are of such a size or nature that they cannot be dipped in a de-greasing tank.

For most electrical cleaning applications, No. 20 mesh corn cob grits, with a specific gravity between 1.20 and 1.40 is used. Instead of producing a peening or cutting action as do rice hulls, walnut shells, peach pits, apricot pits, cherry pits, the corn cob grits clean by wiping.

For the cleaning of mechanical equipment, the most commonly-used grade of sawdust is No. 30 mesh square-cut hardwood. This material, having twelve natural cutting edges, cleans with a cutting and gouging action.

The corn cob grit method of cleaning and maintaining electrical equipment is considered the most efficient for the following reasons:

1. These particles do not contain any organic silica (as does sawdust). Therefore there is no abrasive action on first use.

Fig. 2. Dirty stator windings of the 8400-hp motor before cleaning at Gary Sheet and Tin Mills of U.S. Steel Co.

Fig. 3. After cleaning. Note that windings are now free of dirt and that air ducts of motor are no longer clogged

2. They are highly absorbent, picking up grease, oil, carbon, copper dust, sand, grit.

3. They have medium hardness, with a range that can be varied by changing the tension on the grinding rolls during production.

4. They are non-combustible and non-explosive because they are made from the same part of the cob that is used to make corn cob pipes.

5. They can be supplied absolutely dust free, if this is necessary.

6. They are not too sharp. Their round pellets give a rolling, wiping action rather than a cutting or abrasive action.

7. They are non-conductors of electricity.

8. They won't pick up moisture out of the air.

The average flow of corn cob grit in most electrical-cleaning operations is 200 lb per hour through a ¼-in. nozzle at an average pressure of 40 psi. The cost per pound of this grit is approximately 4 cents.

Corn cob grits pick up impurities such as carbon, copper dust, sand, grit, dirt, oil, grease, during their first use. For this reason, their reuse is not recommended—used corn cob grits act as mild abrasives causing expensive insulation to be eroded away. Therefore, corn cob grits should be considered a one-time-use material. However, after blasting, they make a fine sweeping compound.

Sawdust is probably the best soft grit available for cleaning mechanical equipment because of its light weight, availability, cutting action, and low cost. Its natural cutting edges provide the abrasion needed to quickly clean most equipment in one pass. Because it is only half as heavy as corn cob grit, it will go twice as far. Its price is approximately 3 cents per lb. And it can be re-used without detrimental effects because abrasive action is desirable in mechanical cleaning operations.

The abrasive properties of hardwood sawdust result from the fact that in addition to the natural hardness and cutting edges of its particles, it contains a large quantity of abrasive organic silica. Also, it becomes slightly more abrasive with each run (until it breaks down) because it absorbs abrasive particles as it cleans. This is a further aid to the scouring action.

Soft-grit blasting, as an industrial cleaning method, eliminates the fire and toxic hazards of some solvents. It also eliminates the need for drying periods and permits the cleaning of large equipment in place and with a minimum of dis-assembly. In addition, when the blasting operation is finished, no residue is left on parts.

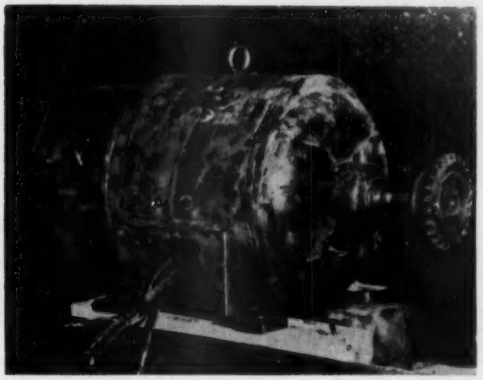
These experiments revealed that of all the soft blast-cleaning materials, corn cob grits give the most gentle action. Of the remainder, rice hulls are the most abrasive—with walnut shells, peach pits, and apricot pits following in decreasing order of abrasiveness. For this reason, corn cob grits were used for the development of this relatively non-abrasive cleaning process.

The AC-4 blast-cleaning machine will operate on pressures as low as 7 psi and as high as 90 psi, the pressure selected being determined

(Continued on page 137)

Fig. 4. This greasy 15-hp motor, shown before cleaning, is representative of jobs that are well done by corn cob grits

Fig. 5. Here is the same motor after the cleaning operation. While unit has not been painted note absence of grease



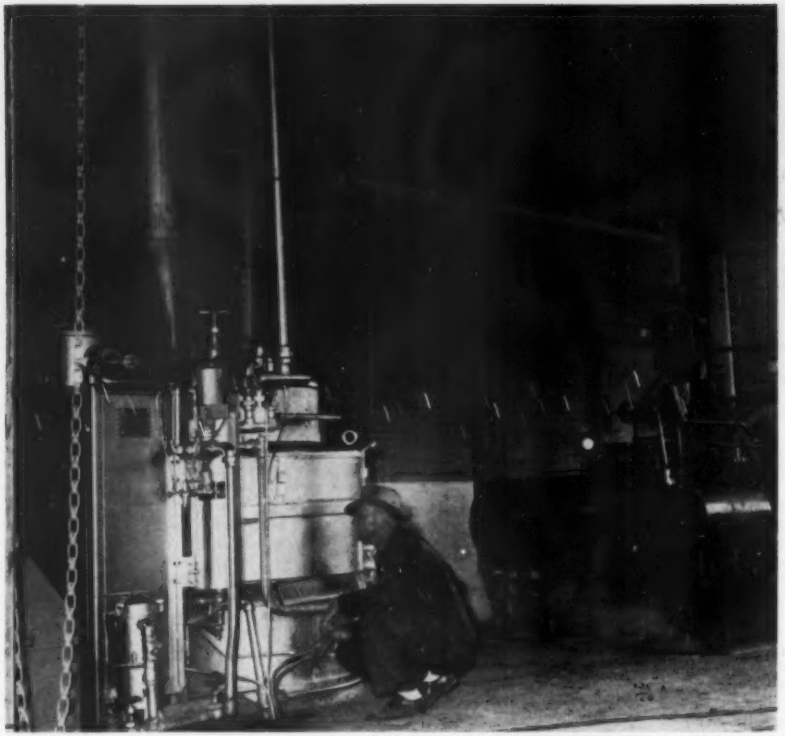


Fig. 1. Author Eiland inspects the new steam generator which has relieved three men to other shop jobs

STEAM and COMPRESSED AIR—

How T & P Cuts Steam and Compressed Air Costs

Practically automatic and interconnected operation of the steam generator and air compressor has given the T & P foolproof supplies of both steam and compressed air . . . They have built some interesting maintenance aids, too

By R. L. EILAND, General Foreman,
El Paso Shops, Texas & Pacific Railroad

General Foreman Eiland of the El Paso Shops of the Texas & Pacific Railroad

STEAM AND COMPRESSED air demands at the El Paso Shops of the Texas & Pacific Railroad vary over a wide range, but when either is needed the supply must be unfailing. In order to get the necessary flexibility and reliability several ideas were investigated and the hook-up shown on these pages was finally selected. We feel that it is not only the best possible arrangement but one of the simplest.

Steam source is a Vapor-Clarkson Model 4740 steam generator arranged to burn either gas or oil. The fuel supply can be changed from one to the other with a flick of a single switch. Gas is the fuel normally burned. The generator delivers from 1000 to 5000 lb of steam per hour at 165 psi for 24 hr a day. There are 2500 ft of steam lines reaching the diesel shops, coach yard, or individual cars for heating or for use in steam jet air conditioning units for cooling; the steam

Steam coils heat the filter-cleaning hot tanks, oil tanks and drying ovens. Steam also keeps waste at proper heat

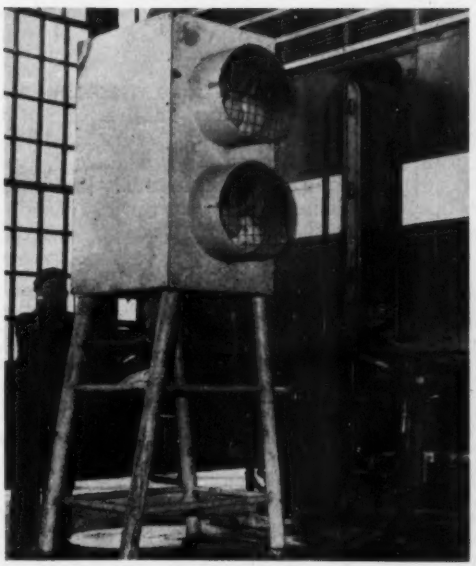
Steam at 165 psi is run through injectors at strategic points to produce hot water for cleaning diesel running gear

pressure is reduced for building heating.

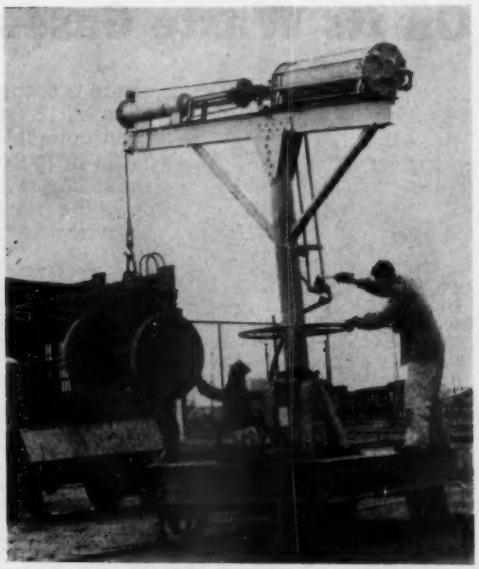
In addition to the above uses steam is also employed to run a 400 cfm, 300 rpm compressor. Requirements call for an air pressure of 115 psi to be maintained at all times in the system comprising 1200 ft of air lines and three 3000 cu ft receivers. Compressor speed is regulated automatically by a Fisher pressure-actuated governor which, at periods of low demand, holds the engine at an idling speed of 30 rpm. Approximately 25 per cent of the steam generator's output is required for the compressor at peak demand.

The photos on these pages illustrate a few of the many uses for both steam and compressed air in the El Paso Shops of the T & P.

Other Things You Can See at the T & P



This roll-around blower with its two 20 in. fans moves cleaning fumes out of diesels during major solvent cleaning operations. The stand, made by R. R. Cravens, T & P Boilermaker, fits against the diesel's side or end doors



One of the many points of use for compressed air around the T & P shops are the 200 lb capacity mobile hoists. These hoists were designed by Author Eiland and are strategically placed to eliminate heavy lifting around the yard and shop

What It Looks Like

Eugene J. Houdry, left, and his chief engineer, William M. Bowen, show how one layer of catalytic units is mounted on another in a typical industrial installation

Could YOUR Plant Be Run On Its Waste Gases . . . ?

Here is a catalytic device which may have wide application . . . Pennsylvania court deciding whether or not it can completely destroy industrial odors . . . At Enamelstrip Corporation it is doing this, has cut gas costs 90 per cent and is also recovering so much previously-lost heat that the baking operation is now self-sustaining . . . Widespread use in printing, textiles, other industries forecast

THERE ARE FEW recorded instances where a court of law has been the stage for an industrial drama. Not so many weeks ago, however, the application of an oxidizing catalyst which transforms industrial odors into useful heat was demonstrated in such a setting.

Court to Decide

The Enamelstrip Corporation, Allentown, Pa., producers of enamel-coated metal strip, were defendants in a suit brought by 92 people living within a half-mile of its plant. These residents had declared, in a bill of complaint issued last September, that "penetrating, disagreeable and noxious odors" came from the plant. They sought to prevent an extension of the plant.

Eugene J. Houdry, French-born scientist and inventor of the well-known Houdry process for catalytic cracking of petroleum, appeared on behalf of Enamelstrip Corporation. In the stacks of this company's plant are the first industrial installation of Mr. Houdry's oxidizing catalyst. Batteries of the catalytic units—each unit an assembly 5½ in. long and made of specially coated porcelain rods—have been installed in each of these stacks venting fumes driven off from the enamel solvents in Enamelstrip's four baking ovens.

According to one of the company officials, results have been amazing. According to Arthur E. Uhleen, executive vice president and general manager of Enamelstrip: "There are absolutely no odors. We're burning the fumes in the catalysts and getting so much heat out of them that we're running the ovens with it most of the time and throwing a lot more away. We plan to heat the plant with part of the excess."

Savings: $3000 per month

The ovens hitherto were heated with gas exclusively. But now, the heat recovery through the catalysts has allowed Enamelstrip to so reduce consumption of gas that they are saving 90 per cent of this cost. These savings average about $3,000

per month. The installation, put in by Enamelstrip engineering department, cost $16,000 of which $13,000 was for the catalytic units. The installation will pay for itself in six months. In addition, according to Mr. Uhleen, they have been able to increase production more than 40 per cent because there is so much heat available from the catalysts.

The Enamelstrip operation now is practically self-sustaining. Gas burners are turned on initially to raise the temperature in the oven to the required degree. As enamel is baked dry on a moving strip of metal, solvent fumes exhausted into the stack by a fan pass over the catalytic elements. Heat thus generated in the elements is brought back into the ovens; the gas burners are then turned off and the operation goes on by itself.

Health Bureau Runs Tests

Supporting assertions that there are no odors coming from the plant is the Pennsylvania Department of Health's Bureau of Industrial Hygiene. The Bureau, in tests on April 9 and again on April 14, detected no odors of solvent vapors in the residential area surrounding the several blocks zoned for industrial use, a sort of island, in which the plant is located. Similar tests were also made on the roof of the plant where an occasional odor of solvent vapor was detected which "appeared to be originating from operations within the plant and not from the effluents exiting from the stacks."

At the court session on May 28, before presiding Judge John H. Diefenderfer, injunction proceedings were adjourned and the judge, taking contesting counsel, attaches and witnesses, went to the plant a mile away for a first-hand look—or smell.

Mr. Houdry explained the catalytic burning of hitherto waste fumes to the judge and some 50 others as they stood on the tarred roof, a little sticky in the hot sun. Back in the courtroom, on the day following the roof-top session, Mr. Houdry demonstrated with the aid of a small pilot plant, what was actually happening at Enamelstrip.

Judge Says No Odors

Judge Diefenderfer, perhaps the most interested man in the court, came down from the bench and watched closely. He sniffed the air above the catalysts and stated he could smell absolutely nothing. The propane gas, which has a penetrating odor, was being completely consumed in the catalysts.

According to Mr. Houdry, it is possible that fumes are still escaping from the plant in small quantities, but that they are not being discharged through the stacks. At least 95 per cent of the fumes are consumed and the other five per cent may be escaping into the plant through vents or directly from the enameling processes. These, he explained, could be sucked up by fans and also directed into the catalysts to be oxidized and converted into heat.

At the end of two days of hearings, Judge Diefenderfer postponed hearings until August, with the understanding that the exact date would be set on request of contesting counsel and that improvements would be made in the meantime to eliminate in-plant odors at Enamelstrip. Measures, in accordance with Mr. Houdry's suggestion, will undoubtedly be taken by Enamelstrip.

Odors Still There?

Earlier, complaining residents testified that they still detected odors. Several said the odors were as intense as before the catalysts were installed in late March, but that they perceived them less frequently.

Another article, appearing on next page tells story of job done at Gorton-Pew Fisheries in the elimination of fumes from a processing job. Queried as to the possibilities of the catalyst eliminating such odors, Mr. Houdry said he was pretty sure it could be done but that it would first be necessary to run a series of tests. Editor

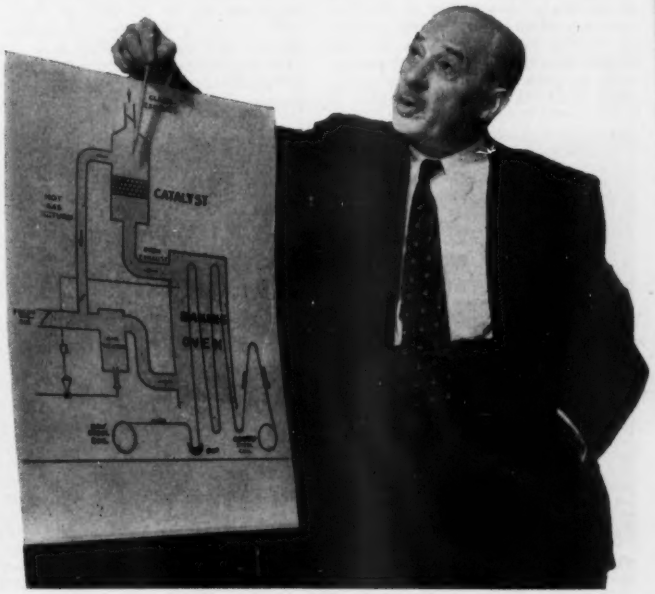
About the Inventor

Eugene J. Houdry probably knows as much, or more, about catalysts than any man alive. One of the first big installations of the Houdry catalytic cracking process was made through his association with Sun Oil Company, Marcus Hook, Pa., where he finally saw his process put to work producing gasoline on a huge scale. The significance of this invention is attested by the fact that 90 per cent of the aviation gasoline used by Allied forces in the first two years of World War II was made by his process.

His present investigations are just one more extension of the long road traveled in 60 years.

How It Operates

Here, Mr. Houdry explains details of one of the enamel baking lines with catalytic installation at Enamelstrip Corp. plant in Allentown, Pa. The steel, unwound from a coil, moves continuously—first through an enamel dip bath and then up and down in the baking oven and out to be rewound. Solvent fumes driven off in the drying process go up and out the exhaust (aided by a fan) and through the catalyst in the stack. Heat created — at temperatures ranging above 1100 F — by the combustion of fumes in the catalysts is piped back into the oven where it bakes enamel and drives off more fumes which, in turn, go through the cycle. The gas heater, which is controlled automatically, is used to bring the oven up to required temperature but, once it gets started, the process is self-sustaining and the burner is completely shut off. Batteries of these catalytic units—each unit an assembly 5½ in. long of specially coated porcelain rods—are installed in each of the stacks venting fumes driven off from the enamel solvents in the company's 4 baking ovens



Industrial Odors Take the Heat Cure

The processing of fish waste presents a definite problem in odor elimination . . . Prominent consideration is directed to the non-condensable gases at the drying stage which cause the largest part of the odor nuisance . . . The company has found the incineration method very efficient in eliminating offensive odors when waste is processed

By JOHN M. KOHR, Plant Engineer, Gorton-Pew Fisheries Co., Ltd., Gloucester, Mass.

THE ELIMINATION of obnoxious odors which permeate the atmosphere surrounding industrial plants is a definite responsibility of industry. A few years ago plants which produced these odors were located in isolated territories and did not have to be seriously concerned. Today with the spreading of residential districts in nearly all directions from large cities and towns, many of these plants are no longer isolated, but are faced with the problem of eliminating these odors.

In our plant, some obnoxious odors are produced in the reduction of fish waste to meal, oil and other by-products, and it is important that these odors be eliminated. Various methods of elimination were studied in an effort to select the one most suitable for our particular operation.

In processing fish waste, it is first cooked in a continuous screw type cooker with direct steam. It is then put through a continuous screw type press to remove as much water and oil as possible. The liquids are centrifuged to remove the oil and the water portion is evaporated to a consistency of 50 per cent solids which is known as fish solubles. During these steps in the process some steam may escape and during the evaporation much is driven off which is slightly odorous. If this steam is collected and condensed in a scrubber or spray tower, there is no nuisance produced.

The solid material from the press is dried and during this operation, the odor problem is quite another matter. In general, the lower the temperature of operation the less obnoxious the odors produced. It then follows that dryers of the steam type, which operate at lower temperatures than the direct flame type, produce less obnoxious odors, but neither are by any means free from nuisance-causing odors. Even the vacuum dryers which operate at still lower temperatures produce obnoxious odors.

Methods Studied

Various types of scrubbers and condensing towers have been used to help eliminate odors. If properly designed they will condense the steam or vapor from the dryer and if the water bearing this condensate is disposed of properly, part of the nuisance will be eliminated. There still remains the non-condensable gases which carry varying amounts of odorous organic compounds. These cause the largest part of the odor nuisance and through the years many ways have been tried to eliminate them with varying degrees of success. Many attempts have been made to dissolve them in water, but they are only slightly soluble so that the many elaborate scrubbers built to do this have been only slightly effective.

Chlorination has been used in a number of ways to eliminate the offensive odors of the stack gases. Chlorine gas was introduced directly into the towers or stack with very little improvement. The water in the scrubbers and spray towers has been treated with chlorine gas to the amount of 25 to 30 parts per million residual, also with little improvement. In both these methods the actual exposure time to the chlorine is very short which may partly account for the lack of success.

The use of a hypochlorite solution derived from either sodium or calcium hypochlorite is claimed to be quite effective in eliminating offensive odors. The solution is introduced into spray water in condensing towers with available chlorine of at least 0.35 per cent and a contact period of not less than half a minute. In most of our present systems it would be difficult to arrange a contact period of this length of time.

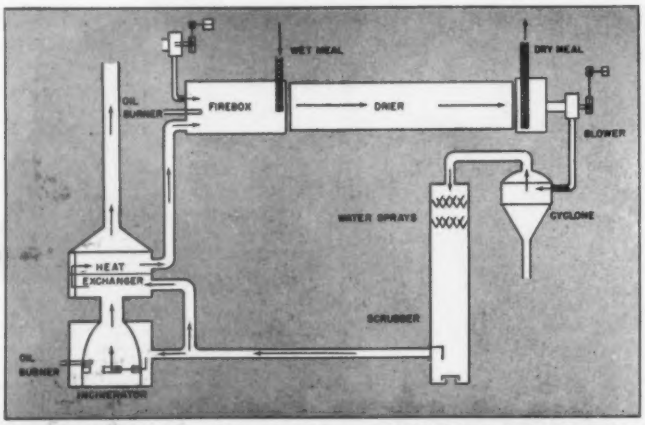
Ozone is a powerful deodorizing agent and may be effective for deodorizing fish reduction gases if it were possible to produce it in sufficient quantities at a low cost.

Masking the disagreeable odors with more pleasant odors has been tried, but with little success. Oils of wintergreen and sassafras were used.

A rather intricate system for absorbing the odors in activated carbon was designed. Although this most likely would have worked properly, the cost of building it was prohibitive. In order to make it work properly, two absorbers would have to be provided so that while one is absorbing odors the other could be reactivated in order to make the process continuous. The carbon is usually reactivated by heating and the odorous material driven off should be disposed of by passing it through an incinerator.

Incineration has proved a most effective way of eliminating the of-

(Continued on page 138)



This flow diagram shows the recirculation system which was devised to reduce the cost of operating a separate incinerator for eliminating industrial odors

Air view of the Joliet plant shows the more than 600,000 sq ft of manufacturing facilities located near Des Plaines river

Last Word in Plant, Equipment, Site for "Caterpillar" in Joliet

Solid rock strata for heavy machinery, good shipping facilities, excellent power supply, good employee reservoir all contributed to the selection of Joliet, Ill. as site for the new Caterpillar Tractor Co., plant . . . Equipment, building, facilities and layout also are of the finest as shown in this story of one of America's newest plants

ONE PHASE in the Company's decentralization program, the Joliet plant of Caterpillar Tractor Co. manufactures such products as scrapers, bulldozers for track-type tractors, rippers, and hydraulic and cable controls. The plant is built on a 300 acre site so located as to enjoy such advantages as an adequate labor market, ready access to transportation by rail, truck or waterway, and good power supply.

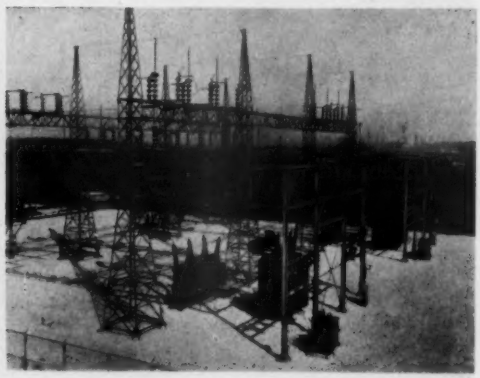
Caterpillar is employing in its Joliet plant, at present, 3,668 people and they expect to pass the 4000 mark by the end of this year.

Water for plant usage is supplied by two deep wells approximately 1550 ft deep, each equipped with a 600 gpm pump which discharges into a 300,000 gal capacity overhead storage tank. Steam for heating and process is furnished by two boilers each of 80,000 lb of steam per hour capacity.

Present electrical consumption of the plant is approximately 2,100,000 kw-hr per month. There are two diesel-electric standby units, one located in the heating plant to provide lights, and to supply power to operate the heating equipment; one is in the pump house to operate a second well pump and a few lights throughout the building.

A propane gas plant with storage capacity of 120,000 gal of liquid propane is located south of the heating plant. It holds 70 days' supply.

All hydraulic control parts pass through this Kolene molten salt bath to eliminate all foreign matter. Note extensive system of tramrails which are installed all over the plant



Power is delivered from the utility at 132,000 volts to this substation where it is reduced to 12,000 volts. From here it is distributed to substations in heating plant and on roof

All lamps, for both indoor and outdoor lighting are serviced from this specially-built boom truck. The problem of servicing the high bay lighting at Caterpillar's Joliet plant is solved, too. In the cage, atop the boom, a maintenance man can reach the fluorescent lights with ease. Driver of the boom truck keeps a close watch on all plant traffic from below

Finish painting of a scraper is shown here being done in a tunnel-type paint booth. Overspray of paints is drawn by air circulation through gratings in the floor of the paint booth and collected in water thus eliminating passage of paint

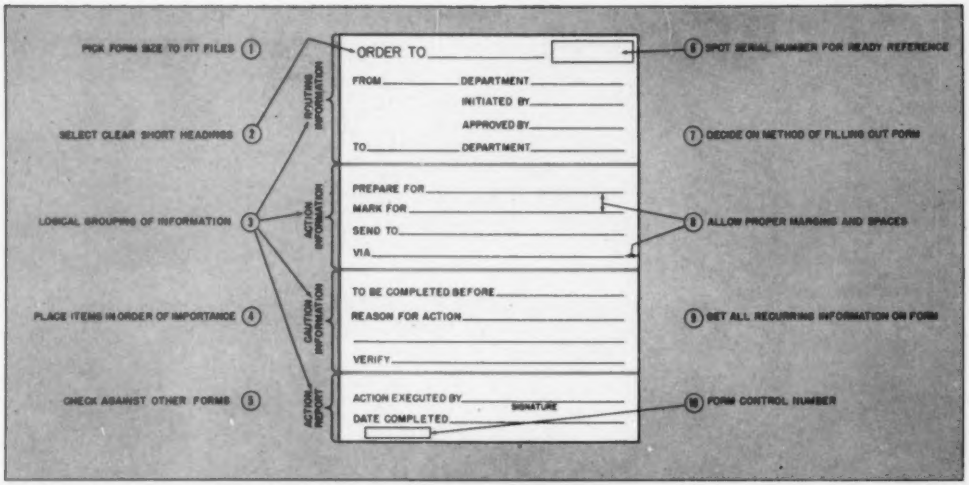
This station, manned by communications operator, is in 24 hr service to receive signals from 27 fire alarm boxes and security patrol stations in plant

Scrap operations at the Joliet plant of Caterpillar Tractor Company are extensive. Shown in the foreground is a partial load of machine shop turnings

This large storage yard is set aside for temporary storage of scraper assembly line parts. Note excellent outdoor lighting

Small tools are reworked in the tool grinding crib. Machines shown include cutter-grinders, drill grinder, carbide grinder, external grinder, universal grinder and a surface grinder

Right: This photo gives good view of one assembly line at Joliet plant. Several No. 10 scrapers are coming off the line while, on the left, is tractor used for the testing operations



This drawing of an imaginary but typical form illustrates the 10 helpful hints listed under the heading "layout of form"

These 40 Practical Hints Tell

How to Design a Good Work Form

Helpful suggestions in good form design cover the ground work, contents and layout of the form and final ordering . . . A review of these hints will help you the next time you have occasion to design a form

By JOHN B. BENNETT, Head of Publication Section, Hazeltine Electronics Corp.

HAVE YOU EVER been asked to draw up a form for company use? Many plant operating executives run up against situations where they have to design a new form to fit a particular operation. Possibly your company has a form-control program and you will never be called upon to prepare a form. Whether or not this is the case, it is well to have a general knowledge of the practical points which should be considered before designing a form.

It is not necessary to take a special course to design a good form. Should the occasion arise where the company needs a new form, all that is required is that you have a good understanding of the problem to be solved. With this background information, check over the 40 points listed to see that all points are considered before you design the form.

Ground Work

Before you begin the actual design of the new form, work up some background information.

1. Define and limit the purpose of the form.
2. Avoid information on the form not related to the operation to be covered.
3. Guard against duplication of forms already in use
4. Adapt existing forms wherever possible.
5. Decide carefully on the distribution of copies of the form.
6. Compare notes with all departments and personnel whose work would be affected by the new form.
7. Check to see how permanent the use of this form is likely to be.
8. Find out how much money can be spent on preparation and printing of the form.
9. Consult everybody who will have to use it and sell your ideas to them.
10. Prepare a procedure for the use of this form to put it into efficient operation.

Contents of Form

Now decide exactly what to put on the form.

1. Be sure to cover all recurring information related to the operation for which you design the form.
2. Assemble all information that will be needed.
3. Pick a good descriptive title for the new form.
4. Show all relevant dates, such as dates of initiation, receiving, transmittal, etc.
5. Include space for all needed signatures and approvals.
6. Provide spaces for "to" and "from" where the form is to be routed.
7. Decide how to number the form.
8. Check against forms which are being replaced to be sure you have not left out information previously covered.
9. Guard against excessive complexity.
10. Review these contents very critically when you are through.

Layout of Form

As a next step, think about a good layout for the form.

1. Pick a form size that will fit in with the filing needs.
2. Select clear, short and appropriate headings for all spaces.
3. Determine the logical sequence for the items of information on the form.
4. Place items that should be seen first in a prominent position on the form.
5. Check this sequence against other related forms used by the company.
6. Put the serial number in a suitable spot for ready reference.

7. Decide if the form should be filled in by hand or typewritten.

8. Allow proper margins and spaces between lines.

9. Make sure all recurring information is actually included on the form.

10. Insert a form control number in line with the company's practice of numbering forms.

Now that the actual design of the form has been completed, consider the following when ordering the form:

1. Find out what kind and weight of paper to use.

2. Consider if it would pay to use colored copies and, if so, how many colors.

3. Determine by what process the forms should be reproduced.

4. See if it is advisable to serially number copies in advance.

5. Consider the possible use of interleaved carbon paper, perforations, etc.

6. Decide if copies of the form would be best assembled in single sheets, pads or cards.

7. Estimate the quantity requirements before placing the order.

8. Order in economic lots.

9. Locate a good storage place for the new form.

10. Decide on the manner of distribution of the form.

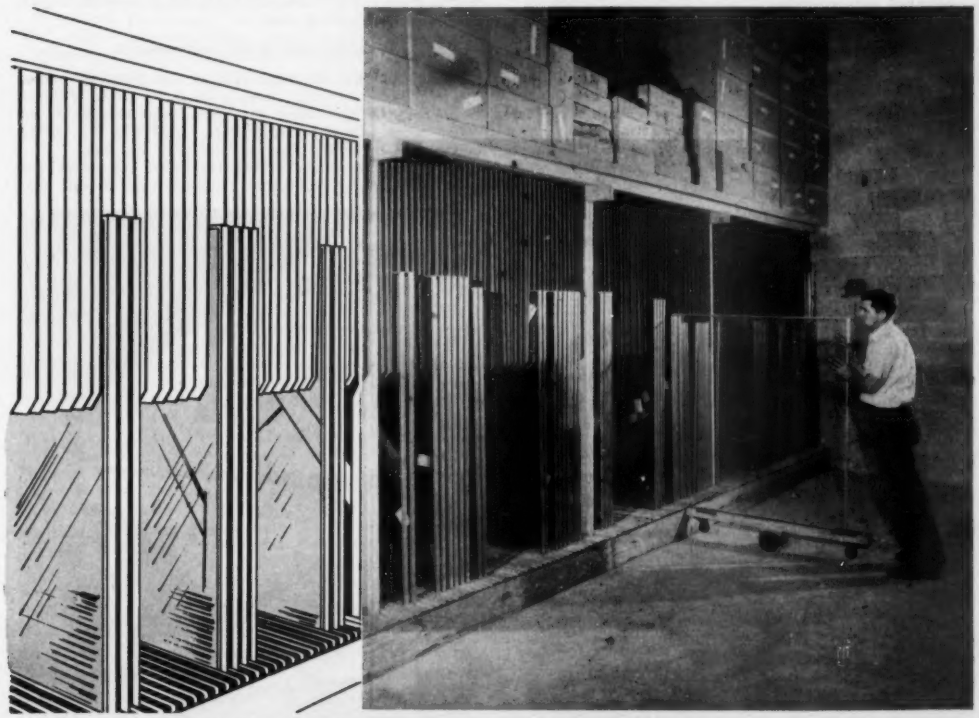
Racks Store Plate Glass Where You Can Find It

Getting the right size glass when needed is no problem with these storage racks . . . Racks are constructed to hold various sizes of plate glass . . . Shop-made dolly permits easy handling of plate glass to and from the storage area

THE PLATE GLASS storage area in the new Milwaukee Branch of Pittsburgh Plate Glass Co., which was designed by their warehouse construction department, holds various sizes of plate glass.

The storage racks are constructed in three heights and have two depths to accommodate the many sizes of plate glass. The lowest height will store glass units measuring from 24 to 50 in. The intermediate height will receive units from 36 in. up to 66 in., and the highest rack supports units ranging from 54 in. to 82 in. in height. The shallow sections have a maximum length for the units of 66 in. and the deeper rack provides space for units as long as 112 in.

In order to facilitate the movement of plate glass to and from the storage area, a plate glass handling dolly was constructed. Like the racks, there are several sizes of dollies to accommodate the different sizes of plate glass. They come in three lengths of 4 ft, 5 ft and 6 ft.



Line-drawing shows detail of how the plate glass storage racks are constructed. Guide strips at the bottom and dividers at top of rack separate each plate glass. A portion of the actual storage rack is shown at right. Note the plate glass handling dolly which is being used to move a pane of glass into one of the guide slots of the storage rack

BUILT-IN INSTRUMENTS

Key to Economy, Efficiency, Production

Increases in production up to 30 per cent are traceable to these units—the only things that can "see" temperature, pressure and electrical impulses . . . Author shows how modern industry could not exist as we know it without the built-in units which we take for granted

By R. T. PIERCE, Chief Production Superintendent
Weston Electrical Instrument Corporation

ELECTRICITY is invisible and is evidenced only by its effects—and its only "watch dogs" are instruments. Probably the oldest example of built-in instruments is the power plant switchboard. With a single ac generator supplying power to a mill, the operator needed to know the amperes, volts, watts, power factor, and speed either expressed as frequency or rpm. He also needed dc ammeters and voltmeters to control the auxiliaries. When other generators were added, means for paralleling them were required and a synchroscope was added.

As power requirements became larger, other stations were built, each requiring its own lot of instruments. Usually, a private phone line connected all stations so the operators could find out what load conditions were at other stations. Eventually, knowing what was going on at each station simultaneously became a necessity in order to control the operation of the system as a whole. Telemetering was installed which told the load dispatcher what each station was producing and oftentimes what each generator in each station was producing.

Later on, as systems expanded, adjacent power companies might have load patterns where they could help each other at critical periods. Lines were added to tie the two systems together, and here again telemetering provided the essential information to load dispatchers on each system for proper operation.

Industry required constant speed from the motors used in processing, which in turn required accurate frequency or speed control. This necessitated a high degree of accuracy in meters and control for the speed of rotation of each generator on the old system.

Complications Bring Improvements

In parallel with the expansion of the electrical system was the increased complications in the boiler room. With one steam-powered generator, the main requirement in the boiler room was a pressure gage. Coal was fed to the boiler to keep up the pressure and that was that.

As systems expanded, automatic firing equipment was added requiring instruments to indicate rate of feed. Effi-

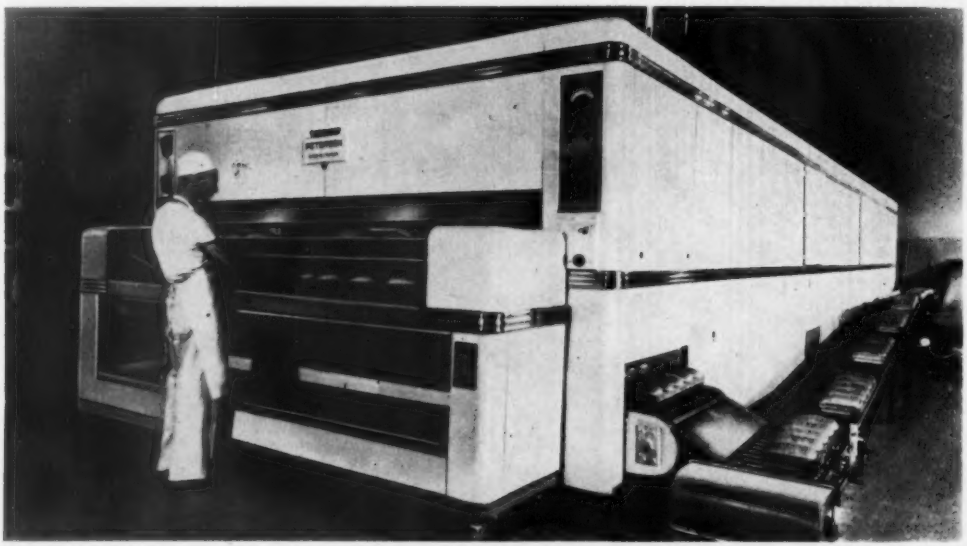


Fig. 1. The instrument scale on this conveyor-type baking oven reads directly in "Baking Time in Minutes"

ciency of operation became a problem, and instruments to show the efficiency of combustion, boiler feed water temperatures, and stack conditions were added. The importance of these can be seen from the fact that today one large utility uses about $63,000,000 worth of coal annually. An improvement in operating efficiency of even 1% means $630,000 savings.

The modern power plant has instruments for each generator, instruments on each transmission line, instruments for the auxiliaries, instruments on each boiler, and instruments to tell the temperature of generator windings, transformers and bearings. Oftentimes, it has instruments to tell what other plants are doing.

Competition Means Improvement

Thus, built-in instruments are the only answer to efficient operation of public utilities. Imagine what it would be like if the operators in the modern power plants had to run around with portable meters and connect them in whenever they needed to get operation data.

Industry has seen this growth and has profited by these experiences. Competition in manufacture has made it necessary to produce more efficiently, quantity manufacture has required accurate and instantaneous knowledge of the progress in each step of process, quality of a product requires an accurate knowledge of what is going on in the processing and a maintenance of standards of procedures. Many of the factors influencing all kinds of process control are invisible and only the effects which they produce on instruments impart the knowledge that is required. Electricity — temperature — pressure— flow in pipes — pH-gases: all can be "seen" only by using an instrument.

When industry was young and processing simple, an operator could carry a thermometer, for example, and check the temperature of the products in his tanks or vats. Today he wants to know what the temperature is at any time, what it has been over a period of time; and he requires a device to control that temperature within rather narrow limits. This requires built-in instruments which are always on the job and which are maintained in first class operating condition.

Each factor that governs the quality of a product and that can be accurately controlled has reached that "control" point in three steps: first, it is measured or indicated; second, it is recorded; and third, it is controlled. Instruments as being discussed here embrace all three of these functions

"In Terms of the Process"

We are living in a complicated age and few realize the complicated processes that are required, for example, to produce the gasoline for driving a car, the soap for a bath, the frozen orange juice for breakfast, or the vacuum tubes for the radio or television set. All of these and many more are made available at reasonable prices because instrument engineers have provided the tools to control the processing. And more things are coming because the need of measurement is recognized in the research stages of new products. Problems of measurement are here today, the new products will come tomorrow.

Many times, the principal advantage of a built-in instrument is that the scale is marked in terms of the process. For example, an electric tachometer consisting of a generator and voltmeter measures revolutions per minute. When applying this to a conveyor type of baking oven, the temperature of the oven is maintained at a constant value and the speed of travel of the conveyor controls the baking time. The conversion is worked out by the process engineer and the instrument scale is marked "Baking Time in Minutes" so the operator gets his information direct. See Fig. 1.

In the textile industry, most machines in the regular production line have tachometer indicators marked "Yards per Minute," thus giving an instant indication of production rate. One machine, known as a slasher, coats the yarn with a starch solution and stretches it at the same time. Each modern slasher is equipped with a tachometer generator at both the input and output ends. The output of these generators feeds into a ratio meter which measures the ratio of output to input and marked "Per Cent Stretch,"—a very

Fig. 2. An ammeter, with its scale adjusted to the motor characteristics and marked "Per Cent Load," gives direct and easily understood information to operator of the machine

Fig. 3. Ammeters are used on milling machines to help determine the proper setting of the cutters and also to indicate when the cutters are dull and need grinding; thus productivity is increased and quality of work assured

Fig. 4. Ammeters are used to measure pressure on certain types of multiple drum machines. This photo shows the application of an ammeter to a brushing lathe operation

Fig. 5. Application of built-in instruments on machine tools of all kinds has been expanding steadily. On big machines, handling large work spoilage is expensive and must be held to a minimum. On machine shown here each motor is metered

Fig. 6. Where machines are equipped with variable speed drives, tachometers are installed to show speeds. In addition to the tachometers there are ammeters installed in connection with each motor. Push buttons shown operate motors

vital factor to be controlled if the yarn is to perform at its best in the looms. Also, the same slasher would be equipped with temperature and level controls on the size box which holds the starch, temperature controllers for the drying rolls, and meter for measuring the moisture content of the finished yarn. Built-in instrumentation in such an installation pays off in quality of work, reduction in spoilage, and increased production.

An ammeter in a motor circuit indicates the load on the motor. The same ammeter with its scale adjusted to the motor characteristics and marked "Per Cent Load" and permanently mounted on a machine tool gives direct and easily understood information to the operator of the machine. He can adjust his cutting tool to get the maximum cut consistent with quality, and it saves overloading which might damage the tool and the motor. See Fig. 2.

How Instruments Help Production

The modern grinder is enclosed and even if it were possible to observe the operation, the setting of the grinding wheel can be done more accurately by observing the reading on the per cent load ammeter. The cutting action of the wheel as well as depth of cut and efficiency of the whole operation is readily evident by the reading of the ammeter. If the grinding wheels are not true, the ammeter readings will be variable. The ammeters also give warning if dressing of the grinding wheel is necessary.

On multihead grinding machines with wheels arranged for roughing, semi-finishing, and final finishing, an ammeter in each motor circuit is the only infallible guide to obtaining satisfactory results. The quality of the finished piece could be seriously impaired if the machine were adjusted to take too deep a grind on the final finishing particularly. Each cut needs to be controlled to produce quality work in the shortest period of time. By proper setting, the increase in production of parts of suitable quality could easily be 25 per cent to 30 per cent.

Another factor to be considered on surface grinders is the hazard to employees. By trying to grind too fast and in excess of the normal load, pieces may be pulled out of their support and thrown for quite a distance from the machine. Some employees have been injured by dislodged pieces.

On wood finishing machines, the same control of each motor is required to gage the depth of cut and the abrasive pressure. There are far less rejections of the finished parts when ammeters guide the operator.

Figure 3 shows how ammeters are used on milling machines to help determine the proper setting of the cutters and also to indicate when the cutters are dull and need grinding. By their use the productivity of the machine is increased and the quality of the work assured.

Instrument Application Expanding

Ammeters are used on wood sanding machines to gage the depth of cut or the abrasive pressure. On multiple drum machines an ammeter in each motor circuit enables the successive adjustment of each drum to contribute its share of the finishing process. Figure 4 illustrates the application of an ammeter on a brushing lathe.

The application of built-in instruments on machine tools of all kinds has been expanding. This expansion has been due largely to the recognition of the advantages by the operator of these machines in producing a quality product by keeping the tools sharp and set properly. Too deep a cut will overload the motor; too light a cut slows production; a dull tool set for the proper depth of cut overloads the motor and may detract from the quality of the job. On big machines handling large work, illustrated in Fig. 5, spoilage is expensive. On this machine, each motor is metered.

Some machines are equipped with variable speed drives for handling different operations. These machines have tachometers to show spindle or hob speeds in addition to the ammeters on each motor. See Fig. 6.

Where testing procedures involve complicated circuitry, complete testing devices, with instruments wired into the circuits, arranged for simple methods of use, are supplied for industry.

Working with High Voltage? If So — Be Sure of Your Equipment

Check to see that all protective equipment used for high voltage work is in top shape . . . This inspection should include all equipment from the rubber gloves . . . to the blankets . . . to the rubber sleeves . . . to the insulator hoods . . . to the line hose . . . to the coats and boots

By PAUL C. ZIEMKE, Safety Engineer, Oak Ridge, Tennessee

THE PROPER TIME to test line equipment is before an accident and not use a fatality as the testing indicator. When one considers how much vital dependence is placed on rubber goods, it proves rather disconcerting to note with what reckless abandon such goods are used, stored and carelessly tested at all too infrequent intervals.

Rubber protective equipment such as gloves, sleeves, blankets, insulator hoods and line hose must be subjected to periodical electrical and mechanical tests and visual inspection. While there are no hard and fast rules laid down there is nevertheless a fairly uniform agreement on standards to be maintained.

The really safety-minded operators consign their line goods directly to the testing lab from the receiving department where a close visual inspection is made to detect obvious flaws such as pin holes, cuts, scratches or embedded matter. All accepted goods are then submitted to the electrical tests. At this point it is worthwhile to note that, with the exception of rubber gloves, protective equipment should not be used on voltages from phase to ground in excess of one third the line voltage.

An additional precaution to be observed is the checking of all goods tested under dry electrodes lest the damage from corona cracking be passed undetected. All goods found unacceptable at this point should be mutilated and salvaged as rubber waste. Any other procedure will find them placed in use once more.

The system of testing is only effective where adequate records are kept up-to-date. Each item should be legibly stamped to identify it from all other items and to disclose ownership where more than one department is sending in equipment. Identification is best achieved by the use of an electric pencil to establish serial numbers. No hole punching or perforations should be permitted.

Rubber gloves should be marked as to grade, for example a Class A glove is intended for use without external protection and a Class B glove is intended for use under leather or other material.

The record cards should be filed by departments, types of equipment and according to a periodic chart indicating when inspections and retests are due, whether equipment is in use or in storage. Notification to the departments of inspection dates should be prepared in triplicate, with a copy for the laboratory, the foreman and his superintendent.

Testing Protective Equipment

Gloves—Rubber gloves should be carefully inspected on the outside and inside surfaces. The availability of low air pressure makes it a simple matter to clamp (by hand) a glove cuff over the orifice for a quick test for pin holes and scuffs too small to be readily detected by the eye. Check the glove by passing your hand over it to detect any possible air leakage. Doubtful units should be checked under water. Gloves should be scrapped that show any defects which may impair their effective use over extended period.

It is important that the gloves be kept clean and free of grease and oil while in the test room. Both are very destructive to all types of rubber goods.

Standardization is desirable in this work where all gloves must meet the specifications agreed upon. Size, length and thickness are factors here. The American Society for Testing Materials has developed a suitable micrometer for measuring the thickness of rubber gloves and has established certain specifications for testing gloves electrically.

In testing for voltage and leakage current, immerse the glove in a tank of fresh water to within 1½ to 2 in. of the edge of the cuff. Then fill the glove with water up to the same point. It is imperative that the cuff be kept dry lest the current develop an arc that would be ruinous to the rubber. The water in the glove and that in the tank form the conductive path once a length of chain is suspended in the open end of the glove. This is the hot leg of the transformer. Both the outer electrode and one high voltage lead from the transformer are connected. To safeguard the gloves as peak voltages are reached, overvoltage protection should be provided in the form of a sphere gap set at approximately 10 per cent above the test voltage. This

Tank is used for voltage and leakage tests of rubber gloves, sleeves and other protective equipment

To see how Hartford Electric Light Co. tests its rubber gloves, please refer to the article "Rubber Gloves Get 10,000 Volts" on page 28 of the Plant Engineers' Digest section in this issue.

gap is in parallel with the gloves under voltage test. The first step is usually 800 v with steps of 500 v being used until the maximum of 10 kv for 3 minutes is reached. After this, it is held at 14 kv for one minute.

After one hour of immersion, measure leakage at 10 kv until 6 readings are made at hourly intervals. Measure leakage after 24 hours, and again at 48 hours of soaking. A selector switch is required for this to test each glove individually and the findings must closely conform with ASTM specifications. With the testing completed, the gloves are either hung up by clothes-pins in a stream of warm air, or are draped over wood pins so arranged to permit the air stream to enter from the cuff end. When dry they are rolled in talc powder to prevent chaffing and then stored in craft paper bags with sealed ends to exclude the harmful effects of sunlight. Storage must be in a dry, cool place not closely associated with high voltage apparatus where coronas may tend to age the rubber, or be exposed to the baneful effects of ozone emitted from opening heavy currents through contactors or circuit breakers.

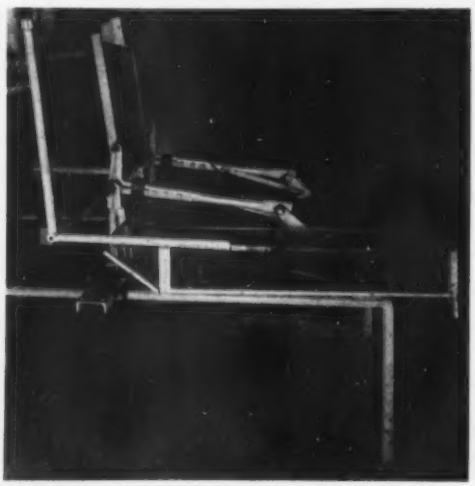
Old gloves are inspected by the same technique mentioned in the foregoing paragraphs for new gloves. Any rejects should be classified as follows: Class A rejects are those that fail on high potential. Class B rejects are those that have bad rubber such as surface blemishes, checks, cracks and pin holes. Class C rejects are those gloves, otherwise good, that have been snagged, ripped, or cut. Class D rejects are mistreated gloves. Avoid classifying gloves in this group unless evidence of willful misuse is quite obvious.

Test all the gloves that pass inspection and as many new ones as are necessary to complete the issue at 10 kv for one minute. Mutilate all rejects.

Sleeves—In testing rubber sleeves, reverse the sleeve by drawing the cuff end up through the body to a point even with the arm opening. Immerse the sleeve in the tank the same way the gloves were tested with 2 in. protruding. The water inside the sleeve, like the glove, and the water on the exterior form the electrodes. Again the high voltage is applied to the chain, the side is tied to ground. Tests are in increasing increments from 500 to 10,000 v for 3 minute intervals. Leakage should not exceed 12 millamperes per square foot.

Blankets—New blankets are usually quite set in a rolled shape from being compactly packed. These tensions must be relieved before testing by applying pressure on a flat surface, stacking them on top of each other overnight, or waiting until the set is eventually relieved by extended storage in spread out fashion.

The popular method of testing blankets is to use dry plates with the upper unit on hinges and counter-balanced for ease of operation. The complete unit is mounted on casters so that it can be easily rolled out of the way when not in use. The plate is of ¼ in. stock with nicely rounded corners. The lower plate is 40 by 40 in. in size to accommodate the 36 by 36 in. blankets. The upper unit is 30 in. square. It is recommended that the tester use ¼ in. sections of wet felt pads to cover the blanket under test. The moisture and the intimate contact with the rubber makes for excellent electrical contact and the elimination of corona damage.



Plating device tests blankets to see if there are any defects which would endanger a lineman's life

When testing the blankets, it is the general practice to operate with the lower fixed plate at ground potential and the upper at high potential since the latter unit is more readily screened for operator protection. A test with 15,000 v for a 3 minute period is about right, although a few operators feel safer at 20,000 v. Unless the wet felt pad is used, a rigid visual inspection is in order. Otherwise corona damage may occur. It is difficult to inspect blankets by a mere glance over the exposed surface. The prescribed technique is to double the blanket and by flexing the material as the blanket is rolled, cracks, creases, or flaws will show up that might otherwise be missed. This means that the blanket will have to be rolled 4 times to bring all possible hidden flaws into focus, since it will be necessary to flex the blanket from top to bottom and side to side for both sides.

Insulator Hoods—Insulator hoods should be inspected by flexing them in several directions to detect creases, splits, air bubbles, gouges and possible embedded foreign matter. To inspect the interior surface of the hood, bend it over a smooth form or object in order to expose the surface not normally in view. Inspect for any defects. In storing the hoods, it is suggested that they be kept in their original containers as this will help maintain their proper shape.

Line Hose—Here the keen eyes of the inspector are required. The inside of the hose can be opened by bending and spreading to reveal the usual run of flaws common to rubber goods. The trick is in spreading the flanges at the end until they snap open, then continue this spread until the full length is exposed.

Coats—These will usually be received folded in cardboard cartons. Interior and exterior inspection will reveal improperly cemented seams, plugged ventilation holes in armpits, and snaps that may work sluggishly. When placed in storage, they should be rolled and wrapped carefully. If space permits, hang them on coat hangers. Again, remember that ideal temperatures and absence from light is a required storage feature.

Boots—Be sure to check the ankle seam of boots since this is the most vulnerable spot in this type of footwear. The manner in which it flexes in the new boot is indicative of the wear to expect. No metal should ever be permitted in the construction of the line boot since it will reduce the much desired insulation factors inherent in good rubber. Good tread surfaces are essential for nonskid features of rough outdoor operations, and should be kept in mind when ordering new boots.

Of recent years some of the larger firms have developed plans for the periodic washing of their equipment. This is a commendable move since every lineman likes the feel of fresh smelling, clean gloves and protective gear. For the gloves, the family washing machine is usually the initial approach with later development of old commercial laundry machinery to take on all the equipment in general use. Water must not be unduly hot, about 85 F, nor the detergent solutions too harsh. Castile soap flakes used in the ratio of 5 oz to 6 gal of warm water is recommended. A 5 per cent solution of Lysol will suit the fastidious person requiring a disinfectant.

Storage for rubber goods should be given careful consideration since the life of such goods will be shortened when exposed to light, heat, oil, or dampness. In addition, there must be ample space for uncrowded shelving and hanger space to permit good ventilation. If the storage must be in the proximity of heavy electrical machinery, the ventilation must be from atmospheres unaffected by heavy arcing, or corona discharges, both of which are most destructive to rubber.

Years of experience with these goods has taught users that the mere storage can be as wearing as daily use. The reason for this is the presence of tension which causes creasing, later cracking, and possibly, total destruction of the piece. This is especially true of such items as gloves turned inside out where the tensions are distinctly severe. The points of early failure are at the finger tips and crotches.

In storing equipment in the truck, try to avoid doubling any equipment if at all possible. Blankets are most ideally stored flat. If this is not possible, they could be placed in metal cans, loosely rolled, to conform with space limitations. Insulator hoods are best store nested, to conserve space. Slotted compartments or pigeon holes should be provided for each crewman's gloves.

Gloves are personal items that must be maintained separately to develop the best of relations among the crew members. The lineman will have the confidence of always having his own gloves to protect him. He alone is then responsible for their care while in his possession. Some companies go so far as to mark each pair of gloves for the individual owner. They are then his until final rejection through wear.

Field Inspection

Field inspections may be handled in various ways. With the smaller firms the foreman may require daily inspection by each man as he withdraws an item from the truck compartment, plus personal testing of his own gloves. With some operators a safety committee makes the rounds to check all the truck equipment. Others depend on their safety engineer to make the spot checks. In any event there is no substitute for conscientious inspections, for these are the life lines of the crews whose existence depends on the best in rubber goods, always.

Protective equipment should be removed from the truck compartments for inspection, washing and drying if they have been exposed to conditions tending to dirty them abnormally or render them thoroughly wet.

Some companies usually arrange to have the night maintenance crew perform this work to avoid interference with day time operations.

Some firms make weekly inspections promptly on Saturday morning, when no high priority emergencies interfere. Others try to pick slack periods during the week to make their inspection. The important thing is that the job be done thoroughly, and periodically.

The prescribed system is to remove the rubber goods from their compartments and inspect each item separately. Here, as in the testing laboratory, check all articles for cracks, burns, abrasions, splits such as found in dead rubber, or other defects which might impair their safety factor on hot work.

All rejects should be well marked by the typical red condemnation tag, then turned into the laboratory, or tool crib, whichever is set up to make the replacement. These field rejects should also be tested at the laboratory since mere visual inspection and consequent rejects could practically bankrupt a line department's budget. As an additional check, require the line foreman to submit a weekly inspection report to his superior, with a duplicate copy which is retained in his files.

Gas Analyzer Prevents Regenerator "Afterburn"

PETROLEUM REFINERS have had to call into play a great deal of ingenuity to meet the constantly increasing demand for refined petroleum products since the end of World War II. Now comes news that the one of the biggest bottlenecks to increased production can be virtually eliminated.

The thorn in the side of the refineries has been the limit set by the carbon burning rate in the regenerator of fluid catalytic cracking units. Known as "afterburn," the bane of a catalytic cracker operator's existence can be prevented by an infra-red carbon monoxide gas analyzer which measures the afterburn's most significant contributing factor, carbon monoxide, and warns the operator when conditions are developing which will start the afterburn.

Furthermore, the analyzer can indicate these conditions no matter where they may be occurring in the regenerator. This was reported at the ASME semi-annual meeting by Joseph L. Serrill, Jr., field engineer of Leeds and Northrup Co., of Philadelphia.

The following specific benefits have been obtained by incorporating the analyzer in a fluid catalytic cracker's operating procedure: 1. Minimum number of afterburns; 2. Increased conversion rate; 3. Increased carbon burning rate; 4. Increased catalyst life; and 5. Improved efficeincy and safety of operations during suspended operations, start ups, shut downs, and during catalyst addition and removal.

Engineering investigation of a large catalytic cracking unit showed that afterburning could occur in the regenerator under a variety of operating conditions and while oxygen or temperature measurements would eventually show an afterburning condition, the afterburn would be so well established that drastic measures would have to be taken to bring it under control.

The gas analyzer operating on the infra-red absorption principle permits a very specific measurement of the carbon monoxide with high sensitivity and very high speed of response to CO changes. The equipment is simple and reliable, being maintained by regular instrument service mechanics at a total maintenance cost of about $8 per week.

Gas analyzers using the infra-red principle are unique in that they can specifically measure only the gas compound for which they are sensitized, regardless of the variations of the other compounds in the gas stream. The infra-red principle is based on the fact that when a beam of infra-red energy is passed through a gas sample, the gas compounds in the sample will absorb infra-red energy from specific portions of the infra-red spectrum.

Furthermore, each gas compound absorbs energy in proportion to its concentration. In other words, the infra-red absorption pattern for each gas compound is like a finger print. There are no two alike, and because there is a difference between each pattern the infra-red analyzer can be sensitized to measure any one gas compound.

A guide for plant engineers to help in specifying construction details of compressors for handling explosive, noxious, or slippery gases

Handling "SLIPPERY" GASES with Compressors

By CHARLES STEMPF, Worthington Corporation

IN THE COMPRESSION of gases other than air, five general gas characteristics require special attention in the design of the compressor and its fittings:

a—The gas is corrosive.

b—The gas is "wet." (low "N" value)

c—The gas is explosive, noxious, or otherwise dangerous.

d—The gas is highly expensive.

e—The gas is "slippery." (low specific gravity)

On Slippery Gases

If the gas is corrosive, it is primarily a matter of properly selecting the materials of construction. "Wet" gases are encountered chiefly in the petroleum industry, and the tendency of these gases to condense in the compressor is usually met by the omission of intercoolers and the use of special separators. These two problems are lengthy subjects, in themselves, and beyond the scope of this article. The following comments apply primarily to the handling of dangerous, expensive, or "slippery" gases such as hydrogen, at relatively high discharge pressures.

The handling of special gases does not necessitate a radical departure from standard air-compressor design, so far as the use of standard frames, running-gear, cylinders, and valves are concerned. The particular problems arising from low specific gravity, high ratio of specific heats, and leakage hazards, can all be met adequately by external modifications to the basic air-compressor design and by judicious selection of the accessories. The goal of the plant engineer, therefore, should be to arrive at detailed specifications which will allow the manufacturer to modify his standard air-compressor patterns to the special service with a minimum of basic re-engineering. This will result in reduced costs and reasonable delivery time without jeopardizing the satisfactory performance and safety of the installation.

To begin with, a good specification will clearly establish the conditions of service, leaving no chance for variations in interpretation. Capacity requirements should be established in cfm of gas actually delivered, measured at suction conditions or at standard conditions. Unfortunately, there is no universal agreement on "standard conditions of temperature and pressure." Thus, when "standard conditions" are used as the criterion, they should be exactly defined in the specification.

The use of piston displacement as a measure of capacity is misleading and tends to penalize the bidder who can offer a relatively high volumetric efficiency, one of the best indications of a well-designed machine. Suction pressure and temperature should be stated as well as the desired discharge pressure. Pressures should be identified as gauge or absolute. The altitude of the site should be stated, particularly is over 3300 ft above sea level.

Where the gas handled is not one of those listed in the attached table of gas properties, the purchaser should establish its molecular weight and ratio of specific heats. If the gas is a mixture, or is impure, a detailed analysis should also be provided.

When the conditions of service are stated completely and precisely in this fashion, it insures both that the compressor is properly selected to perform as required and also that all manufacturers are bidding on an equal basis. The next step is to establish adequate standards for design, materials and fittings.

Primary consideration for most applications will be the prevention of gas leakage into the surrounding room, whether for reasons of danger or conservation. Obviously, the continuous leakage of process gas to the atmosphere is costly, even if no particular hazard exists. It is, therefore, desirable to return all controlled leakages to suction wherever practical.

Leakage at Stuffing Box

Since leakage is the principal problem, it is virtually rule-of-thumb that the number of stuffing boxes should be kept to a minimum. Thus, for multi-stage high-pressure work, the use of tandem-staging on a single frame is usually preferred, within practical capacity and bhp limits, because the only true stuffing box is on the crank end of the second stage cylinder adjacent to the compressor frame. All other leakage occurs from higher to lower pressure

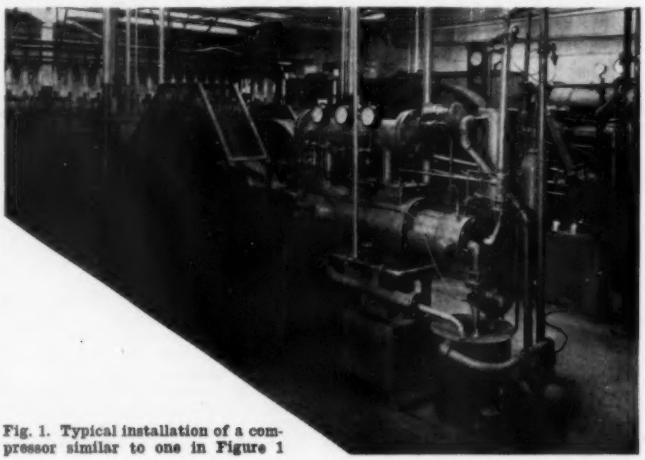


Fig. 1. Typical installation of a compressor similar to one in Figure 1

stages and results in no escape of gas from the system. Tandem staging up to four stages is normal practice, a typical arrangement being illustrated in Fig. 1. Note the order in which the stages are grouped. The second stage is single-acting on the crank-end; the third and fourth stages, on the head end. The first stage is double acting. By this arrangement, the frame loading is approximately equalized, yet the stuffing box is subjected only to relatively low second-stage pressure. Figure 2 shows a typical installation of one of these machines.

Controlling Leakage

To control leakage from the single stuffing box, a double-seal housing is installed between the second stage cylinder and the frame. Conventionally, the double-seal housing consists of a pressure-tight distance piece of sufficient strength to prevent that portion of the piston rod which enters the cylinder from entering the frame end. Pressure-tight, bolted and gasketed, covers are provided to allow access to the packing. See Fig. 3. The housing may be filled with an inert gas at positive pressure, if gas of a suitable type and pressure is readily available. However, the most common practice is to vent the housing back to the compressor suction or to the building exterior.

In some cases, it is desirable to provide a way of determining roughly how much leakage is occuring through the stuffing box, since excessive leakage here may affect over-all efficiency. Also, the amount of leakage will give a clue to the condition of the packing. To accomplish this, the specifications may provide that the piston rod is to be fully submerged in oil within the double-seal housing. By this method, it is possible to observe visually the amount of stuffing-box leakage occurring at any time, these deviations being made through a bull's-eye located at oil level.

When the oil bath is used, the double-seal housing should be water jacketed to prevent excessive oil temperature due to the piston-rod's passing in and out of the hot compressor cylinder. Provision should

N value and properties of various gases with figures given on the basis of a gas at 60 F temperature and with a pressure considered to be at 14.7 absolute

Name of gas	Symbol	Cp/Cv. =N	Spec. grav. Air = 1.00	Mole. wt.	Lb./ cu.ft.	Cu.ft./ lb.	Boiling point at atmos. press F.	Critical temp F.	Critical pres. lb. abs.
Acetylene	C_2H_2	1.3	.9073	26.0156	.06880	14.534	−118	96	910
†Air		1.406	1.000	28.9752	.07658	13.059	−317	−221	546
Ammonia	NH_3	1.317	.5963	17.0314	.04509	22.178	− 28	270	1638
Argon	A	1.667	1.379	39.944	.10565	0.467	−302	−187	705
Benzene	C_6H_6	1.08	2.6953	78.0468	.20640	4.845	176	551	700
Butane	C_4H_{10}	1.11	2.067	58.078	.15350	6.514	31	307	528
†Butylene	C_4H_8	1.11	1.9353	56.0624	.14826	6.7452	21	291	621
Carbon Dioxide	CO_2	1.30	1.529	44.000	.11637	8.593	−109	88	1072
Carbon Disulphide	CS_2	1.20	2.6298	76.120	.20139	4.965	115	523	1116
Carbon Monoxide	CO	1.403	.9672	28.000	.07407	13.503	−313	−218	514
Carbon Tetrachloride	$C\,Cl_4$	1.18	5.332	153.828	.40650	2.4601	170	541	661
Carbureted Water Gas		1.35	.4090						
Chlorine	Cl_2	1.33	2.486	70.914	.18750	5.333	− 30	291	1118
Dichloromethane	CH_2Cl_2	1.18	3.005	84.9296	.22450	4.458	105	421	1490
Ethane	C_2H_6	1.22	1.049	30.0468	.07940	12.594	−127	90	717
Ethyl Chloride	C_2H_5Cl	1.13	2.365	64.4960	.17058	5.866	54	370	764
Ethylene	C_2H_4	1.22	.9748	28.0312	.07410	13.495	−155	50	747
Flue Gas		1.40							
Freon (F-12)	$C\,Cl_2F_2$	1.13	4.520	120.9140	.31960	3.129	− 21	233	580
Helium	He	1.66	.1381	4.002	.01058	94.510	−452	− 450	33
Hexane	C_6H_{14}	1.08	2.7395	86.1092	.22760	4.393	156	454	433
Hexylene	C_6H_{12}		2.9201	84.0936	.22250	4.4951			
Hydrogen	H_2	1.41	.06952	2.0156	.00530	188.62	−423	−400	188
†Hydrogen Chloride	$H\,Cl$	1.41	1.268	34.4648	.09650	10.371	−121	124	1198
Hydrogen Sulphide	H_2S	1.30	1.190	34.0756	.09012	11.096	− 75	212	1306
Iso-Butane	C_4H_{10}	1.11	2.0176	58.078	.15365	6.5135	14	273	543
Iso-Pentane	C_5H_{12}		2.5035	72.0936	.19063	5.2451			
Methane	$C\,H_4$	1.316	.5544	16.0312	.04234	23.626	−258	−116	672
Methyl Chloride	$C\,H_3Cl$	1.20	1.785	50.4804	.13365	7.491	− 11	289	966
Naphthalene	$C_{10}H_8$		4.423	128.0624	.33870	2.952			
†Natural Gas* (App. Avg.)		1.269	.6655	19.463	.05140	19.451		− 80	670
Neon	Ne	1.642	.6961	20.183	.05332	18.748	−410	−380	389
Nitric Oxide	NO	1.40	1.037	30.008	.07935	12.605	−240	−137	954
Nitrogen	N_2	1.41	.9672	28.016	.07429	13.460	−320	−232	492
Nitrous Oxide	N_2O	1.311	1.530	44.016	.11632	8.595	−129	98	1053
Oxygen	O_2	1.398	1.105	32.000	.08463	11.816	−297	−182	735
Pentane	C_5H_{12}	1.06	2.471	72.0936	.19055	5.248	97	387	480
†Phenol	C_6H_5OH		3.2655	94.0468	.24870	4.022	360	786	889
Propane	C_3H_8	1.15	1.562	44.0624	.11645	8.587	− 48	204	632
Propylene	C_3H_6		1.4505	42.0468	.11115	8.997	− 52	198	661
Refinery Gas* (App. Avg.)		1.20							
Sulphur Dioxide	SO_2	1.256	2.264	64.060	.16945	5.901	14	315	1141
†Water Vapor (Steam)	H_2O	1.33**	.6217	18.0156	.04761	21.004	212	706	3206

* To obtain exact characteristics of natural gas and refinery gas, the exact constituents must be known.
** This N value is given at 212 degrees F. All others are at 60 degrees F.
Authorities differ slightly, hence above data average results.

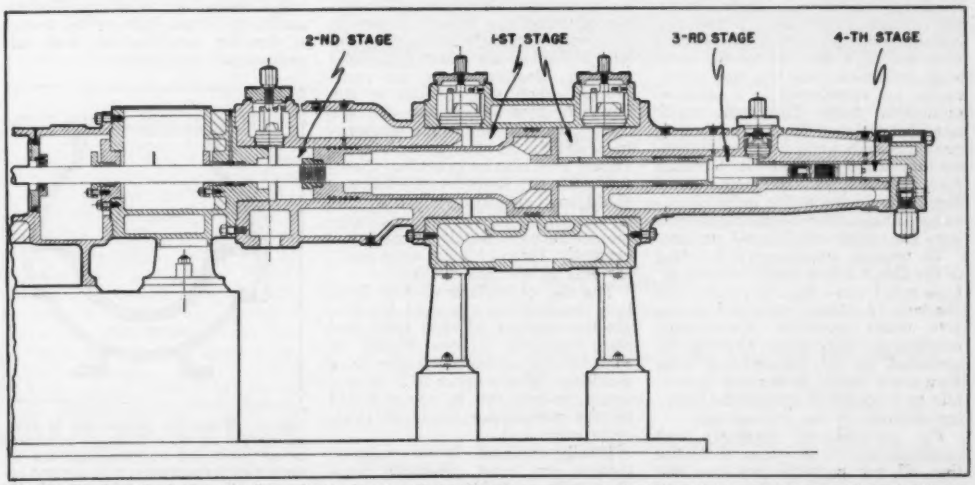


Fig. 2. Tandem staging, up to four stages, is normal practice in compressors handling "slippery" gases such as hydrogen

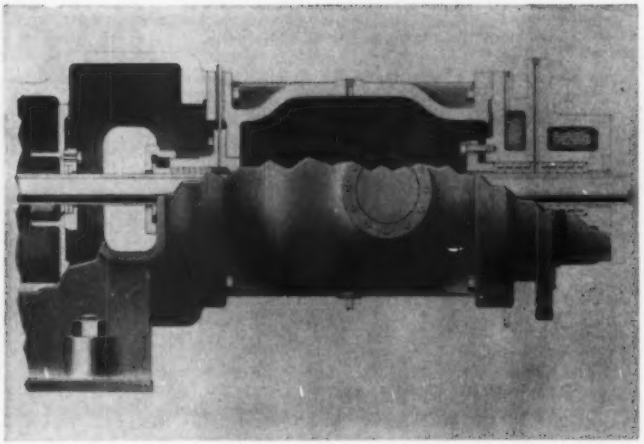


Fig. 3. Double-seal housings are installed between the second stage cylinder and the frame in order to control leakage between the single stuffing box and frame

also be made for a suitable oil drain connection and scraper rings at the stuffing box to prevent excessive oil carry-over into the cylinder. Figure 4 shows a cross-section of this type of housing.

There is some difference of opinion as to whether fibrous or metallic packing should be used. In any case, it is good practice to provide for a vented lantern-ring in the stuffing box. If soft packing is used initially, this connection can be plugged. Then, should a change become desirable, metallic packing can always be substituted and the vent connection piped up either to the double-seal housing or directly back to suction.

For compressors of this type, standard shell-and-tube type intercoolers can be used after the first and second stages in multi-stage machines. Admiralty metal tubes and Muntz metal tube plates are recommended for long life. In a four-stage machine, the coils for the third stage intercooler and the final aftercooler are submerged in a common cylindrical tank. This tank, itself, need be designed for a low working pressure even when used on a closed cooling water system. A bursting disc, provided with the tank, allows the gas to escape to the building exterior in case either of the high-pressure gas cooler coils should rupture.

To prevent unnecessary bursting of the disc, a low-pressure reseating-type relief valve may be installed in the tank to relieve occasional excessive water pressure. Extra-large condensate separators should be provided in all intercoolers with blowdown being performed manually as a safeguard against the blowing-through of the process gas.

For periods of shutdown and maintenance, it is often desirable that all gas passages between the main suction and discharge valves of the compressor be completely and easily evacuated of hazardous gas. This can be accomplished by the use of a single vacuum connection to the compressor, if the compressor utilizes a light, spring-free type of valve which will seat firmly or open freely under a small pressure differential. Since the compressor can be turned over during the evacuation process, any possible gas pockets can be cleared.

Adequate warning, shut-down, indicating, and other protective devices should, of course, be specified. Each intercooler, and the aftercooler, should be protected by the installation of a vented, reseating type relief valve in the discharge line from the preceding stage. An instrument panel should be provided, complete with a discharge pressure gauge for all stages and, if desired, thermometers to indicate entering and leaving gas temperatures for all stages. A pressure switch should be provided for protection against high-head pressure, shutting down the compressor when gas exceeds a safe limit. A pressure switch for the cooling water system and a temperature switch for the gas discharge (final) may also be provided. However, since frequent involuntary shutdowns are undesirable, and since water failure or high discharge temperature can usually be remedied promptly, these switches need operate only as warning devices.

The use of multiple-V-belt drive is a standard arrangement for single-frame units of this type, and static-resistant V-belts should be specified to minimize danger from sparking. Where space is at a premium, motors can be top-mounted on the compressor frame at moderate extra cost.

Totally enclosed, force-ventilated motors are most practical, since there is no available commercial explosion-proof motor enclosure which will provide absolute protection in an atmosphere of some gases such as hydrogen. A positive pressure above atmospheric of about 10 in. of water should be adequate for motor ventilation, and the motor end-seals should be designed accordingly. Conduit boxes can best be made explosion-resisting by filling them with compound during installation. So far as the motor controls are concerned, the explosion hazard can best be circumvented by locating them in a separate room.

Automatic unloading is not usually provided with these units, although special controls can be furnished as required. Initial unloading can easily be provided by the purchaser through the use of a separate valve to by-pass from compressor discharge back to suction.

The following should be called for as standard compressor equipment:

Force feed lubrication for cylinders; Metallic wiper rings in the intermediate frame oil head; Crankcase oil level gauge; Sight jacket water cones; All necessary special wrenches.

Stainless steel piston rods, for longer life, are available at small extra cost. Other recommended materials of construction are as follows: Frames—cast iron; Connecting rods—carbon steel forging; Crankshafts—carbon steel forging; Crossheads—cast iron; Crosshead pin bearings—bronze; Crankpin bearings—steel shell, babbitt lined; Main bearings—double, tapered, roller type; Cylinders—cylinder high grade cast iron; Low pressure pistons—cast iron; High pressure pistons—carbon steel; Piston rings—cast iron; Piston rods—carbon steel (unless stainless specified)

(These recommendations apply, of course, only where the gas handled is not of a corrosive nature.)

By following this specification guide, the plant engineer can insure a durable, trouble-free, and safe compressor installation.

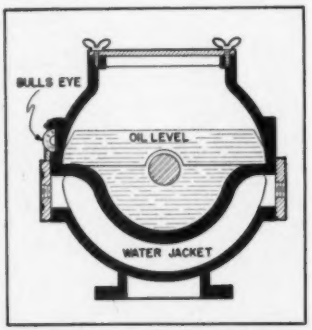


Fig. 4. When the piston rod is fully submerged in oil, a bulls-eye is located at oil level and scraper rings are installed at the stuffing box to prevent excessive oil carry-over into the cylinder

Here They Are . . . for July

PLANgineering Contest Winners

JULY'S FIRST and third prize winners are real moneymakers for their authors. Originally award winners in plant suggestion systems, these ideas were singled out as plant engineering material. As such, they were submitted in the PLANgineering Contest, and again won awards.

FIRST PRIZE of $100.00 goes to Lewis Sharp, machinist at the Dodge Manufacturing Co., Mishawaka, Indiana, for his idea for rehabilitating industrial truck tires. SECOND PRIZE of $50.00 goes to Chester Smith, Works Engineer at the Atlas Powder Co., Houghton, Michigan, for his method of preventing crystallization failure in machine bolts. THIRD PRIZE of $25.00, won by John Hryczyszyn of the American Manufacturing Co., Brooklyn, N. Y., recognizes another suggestion system alumnus in the design of a lifting tool for heavy drums. The building of an arbor press gave the FOURTH PRIZE of $25.00 to E. P. Davidson, Plant Engineer at Armstrong Cork Co., Dallas, Texas.

The prize-winning entries not presented on this page are described in the Maintenance and Operation section, which begins on page 44.

July's First Prize Winner Tells of Tires Trimmed for Triple Life

Submitted by Lewis Sharp, Dodge Manufacturing Co., Mishawaka, Indiana

SOLID TIRES on industrial lift trucks get a lot of punishment. Their short turning radius, coupled with continuous quick stops and starts, causes flat spots on the tires, and in many plants solid tires are cut by steel turnings or burned by spilled iron in foundries.

A rough, torn or out-of-round tire, causing the truck to bump along the plant floor, can be extremely hazardous to the driver, and to plant personnel, should a load be joggled off the forks of a truck. Usually, tires which had been abused or worn to this condition had to be discarded.

Discarding a set of wheels with damaged tires and installing new wheels was a very costly procedure, in our case exceeding $1200 per year. Turning the outside diameter of these tires on an engine lathe makes them smooth and concentric, ready for replacement on the truck wheels. With this repair, the tires are available for reuse, and service life of an average tire has tripled.

ENTER NOW — TIME IS SHORT!

If YOU haven't entered yet, follow the easy rules printed on this page, and submit your Production, Maintenance or Operation idea in the September PLANgineering Contest. Don't make your entry long or elaborate . . . just explain WHAT YOU DID, to make your operation easier, safer, or more economical. A sketch or photograph, with your entry, adds value and clarity to the entry.

The September Contest will be the final PLANgineering Contest, so send in your entry before the deadline, and let your idea represent you in the judging for the $200.00 in monthly prizes.

RULES OF CONTEST

1. Entries must not exceed 500 words in length.

2. Entries will be judged on basis of originality of idea, on how generally the idea may be applied to other plants, and on the time and money-saving possibilities inherent in the idea.

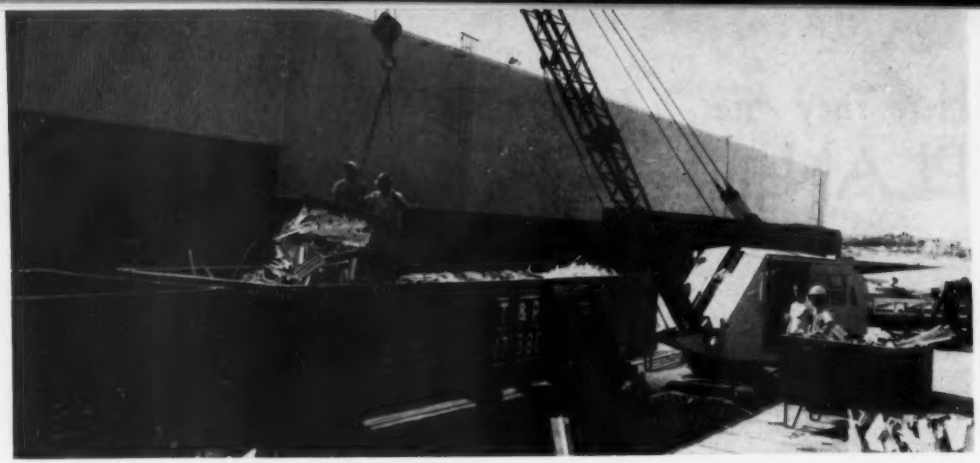
3. All entries, whether prize winners or not, will be paid for at regular rates if they are later published in PLANT ENGINEERING.

4. Deadline for entries in the September Contest is July 25th; this will be the final PLANgineering Contest.

5. No consideration will be given to entries which have been published elsewhere.

6. Judges of the contest will be three members of the Plant Engineers Club of Chicago; their decision will be final.

7. Send entries to: Contest Editor, PLANT ENGINEERING, 110 So. Dearborn St., Chicago 3, Ill.



SCRAP-HANDLING PROBLEMS

Out of the second User-Manufacturer workshop type clinic held by the Material Handling Institute come these excellent suggestions for scrap handling . . . Maybe your problem is here. If it is, it's a good bet the answer is, too

TODAY, MANUFACTURERS with extensive operations and numerous employees are plagued with scrap disposal difficulties, ranging from metal turnings and chips to paint and oil sludge, paper and refuse disposal. To find solutions for some of these headaches, operating executives from invited industrial users of material handling equipment presented specific problems to the application specialists in attendance at the second clinic held by MHI.

Chairmanned by Walter E. Schirmer, president of the Industrial Truck Association and vice-president of the Clark Equipment Company, Industrial Truck Division, the operating executives included representatives of: Caterpillar Tractor Co.; Deere and Company; Ford Motor; International Harvester Co.; Rockford Drop Forge Co.; The Falk Corporation.

Answering the inquiries of these firms were manufacturing representatives of various types of material handling equipment. These representatives proposed possible solutions that would provide greater efficiency and economy in the removal of scrap and waste material. Manufacturers represented included: American Monorail Company; American Steel Dredge Company; Dempster Brothers; The Frank G. Hough Co.; May-Fran Engineering, Inc.; Mercury Manufacturing Company; The Union Metal Manufacturing Company; and The Yale and Towne Manufacturing Company.

Although attendance at these Symposiums is by invitation only, you may request to be represented at future conferences by writing The Material Handling Institute, Inc., 1108 Clark Building, Pittsburgh, Pennsylvania.

Combustible Waste, Container-Handling Problem

Problem presented by J. A. Wall, Special Assignments, Production

CATERPILLAR TRACTOR CO., Peoria, Ill., presented several problems encountered in their scrap disposal program. They employ two incinerators for burning disposable waste. However, they are concerned with the possibility of flying sparks even though screens are now provided for the stacks. The question is: how can the sparks be controlled?

Solution: The conference participants were unanimous in their selection of steam jets installed in smoke stacks to control the sparks.

Problem: How to dispose of waste oils and non reclaimable paint sludge.

Solution: Those delegates with experience in this connection recommend and practice burning oil and paint sludge. In some cases waste oil is given away to a salvage operator in return for picking it up.

Problem: How can returnable paint and oil containers be handled cheaply?

Solution: It was the consensus that the major problem is one of controlling container use in the plant. In some instances these containers are rendered unusable by workmen who use them for storing liquids, then spoiling them for the original use. In other cases, the containers are ruined by converting them to rubbish receptacles. Unless care is taken to preserve such containers there may be considerable loss where they are billed to the user.

Problem: A question was raised concerning current practices in palletizing and the use of returnable vs disposable containers.

Solution: On the subject of containers, it was mentioned that at one firm they prefer disposable containers which can be burned after using. This firm has standard steel containers for use in the plant and makes it a practice to transfer all material to the proper steel container upon receipt of the shipment and before it is transported to the plant area.

The practice of a large automotive manufacturer is to make the vendor completely responsible for the method of shipping and type of container em-

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ployed. Parts thus shipped are then transferred to steel containers owned by the manufacturer. Essentially, this form makes the vendor responsible for the return of returnable pallets and containers, if they are used by the vendor. When the vendor is given a free choice as to the method of shipment, he can be more readily held responsible for damage and loss in shipment. However, even in this instance, the manufacturer accepts returnable type shipping containers and pallets only from vendors in the local area where the exchange can be made conveniently by the shipper. Use of an even exchange system may eliminate considerable bookkeeping.

Discussion then led to the interesting fact that the philosophy of shipping has changed radically in the past few years. For example, only a few years ago most larger manufacturers insisted upon palletizing most, if not all, shipments.

Today many companies, including ones represented on the panel, find it more economical to have rough parts—castings, forgings, stampings, and even finished parts of certain types—loaded loose in freight cars or trucks. This practice has been made possible by the versatility of fork trucks and other industrial equipment fitted with scoops of special design.

Upon receipt, the parts are unloaded by fork trucks and then packed in unit loads or in standard shop containers.

Palletizing, however, is still employed for the shipment of finished parts and assemblies.

Another current practice, utilizing fork trucks of modern types, was outlined. This is in connection with the shipment of large parts and stampings without the use of pallets or containers. In this case, some firms stack the loads on special racks from which the loads are picked up by fork trucks, using special fixtures.

This method has limitations at the start due to the need for a variety of fixtures to handle different kinds of loads. The solution to this problem has been found in the design of quick-exchange fixtures for fork trucks, the exchange now being made from one fixture to another in a matter of minutes.

Have to Keep the Balers Going All the Time

Problem presented by W. J. Dernberger, Supervisor, Material Handling Engineering

METAL STAMPING DIVISION, Ford Motor Co., Dearborn, Mich., is a large stamping plant in which it is necessary to maintain a flow of sheet metal scrap and offal from the press lines to the balers in a continuous and uninterrupted flow. The press shop now produces about 800 tons of scrap a day on 18 press lines. The major part of the problem is to keep balers operating continuously and at the same time make sure that scrap is removed from the presses to maintain production.

There are some secondary considerations that influence this problem. First of all, the nature of the scrap varies, and even though it is cut in the press dies this has an effect upon the loading of balers, sometimes producing under weight. Specifically, it is necessary to supply enough material, regardless of size, to produce bales weighing 1200 lb each.

At the present time scrap is being accumulated in castered bin containers designed for fork truck operation, revolvator dumping being employed. Containers are pushed onto a floor level platform with bin-box hold-down. The platform is revolved to dump the contents onto a wide steel belt conveyor. The conveyor raises the scrap 10 ft in 30 ft and pours the scrap into the baler opening.

The installation comprises two platform dumps with individual steel belt conveyors and balers.

Problem: To develop a method having the proper arrangement for pre-dumping by fork-truck attachment into a supplemental hopper ahead of the baler or some alternate method that would be an improvement over the present system. Essentially, the means devised must assure a sufficient supply ahead of the balers to maintain their continuous operation and to produce 1200 lb bales. In addition, they have two handlers at each baler and there would be a decided advantage in any new method that would reduce the number of operators involved.

Solution: There was considerable discussion of various solutions, including the use of conveyor systems throughout; the possibility of using supplementary containers; and other ideas designed to effect smoother flow of the charge to the balers.

One of the many ideas under discussion, was summarized as follows: It was pointed out that problems of building construction rule out some of the proposed solutions. Essentially, it is a matter of leaving the layout unchanged but correcting the situation at the discharge end of the present conveyor. To one delegate's way of thinking, the solution lies in some form of batch-type loading to maintain the proper weight of scrap by providing a suitable number of supplementary hoppers ahead of the balers to assure a continuity of scrap flow. The dumping of scrap into the hoppers would be accomplished by fork trucks with revolvator.

The preferable solution is a combination of two major elements. It would involve the installation of some suitable weighing-scale hopper which would assure a standard-weight load for each charging cycle. This would be used in combination with the present servicing conveyor, where fork trucks dump directly onto the conveyor.

To Bale or Not to Bale, That Is the Problem

Problem presented by R. H. Weingartz, Material Handling Engineer

DEERE & COMPANY, Moline, Ill., has one plant with a scrap problem similar to many other plants in the same organization—that of having various manufacturing operations spread over a wide area.

The punch and shear, machining, primary assembly and final assembly are in individual buildings connected only by roadways. All departments are in single-story buildings except the machining departments, which are located in a five-story building.

The firm's representative showed blueprints of his plant's layout, illustrating the centralized scrap disposal area and its relation to the departments from which scrap emanates. While most scrap-production areas are reasonably close to the final disposal point, one area at a relatively greater distance.

All scrap hoppers (Roura type) are placed in the outgoing stations in the processing departments. Fork trucks responsible for plant materials handling between zones are required to transport the hoppers periodically to the scrap accumulating area, dump them into the scrap bins, and return to the departments where they originated. The scrap is loaded into railroad cars by bucket crane for shipment. Approximately two carloads (50 to 60 tons) are accumulated each week.

In some plants, the scrap hoppers are used to load directly into demountable truck bodies instead of storage bins. When the truck bodies are filled, they are transported to the scrap dealer's yard with his equipment.

One advantage to this system is that the demountable truck bodies can be placed in more strategic locations, in relation to the departments. This reduces, somewhat, the lengthy tour around the plant in delivering the scrap to the final storage bins.

The rental charge for dealer's equipment more than offsets the manual handling cost of the scrap. The firm receives the same price per ton from dealers, whether the scrap is loaded into gondola rail cars or onto demountable truck bodies.

Problem: Whether it would be advisable to consider baling and briquetting equipment, or what improvements could be made to the present methods to reduce scrap handling costs.

Solution: The first part of the problem

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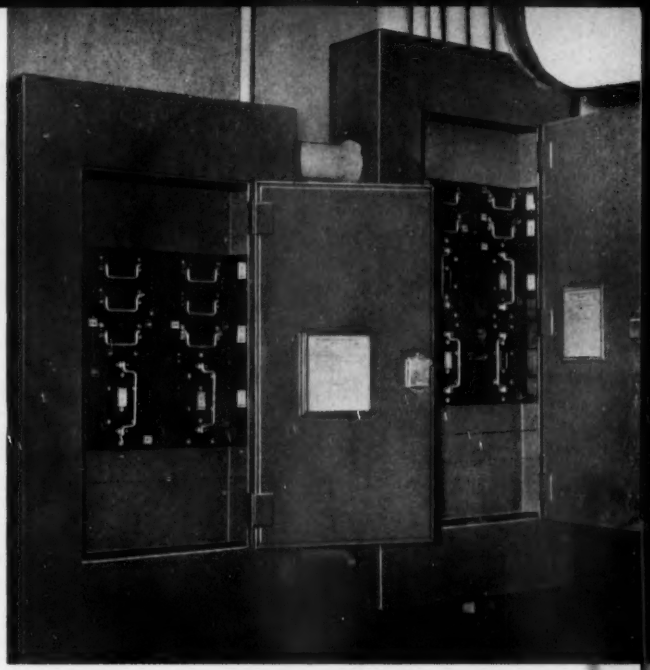

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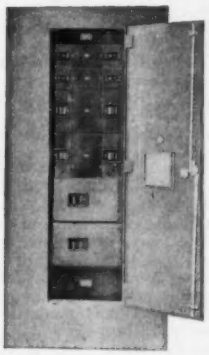

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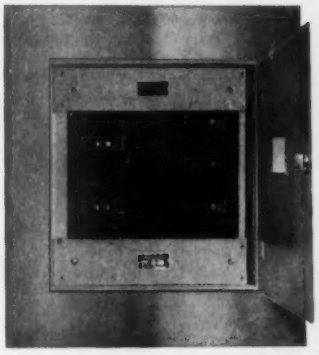

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developed the conclusion that, because of the relatively small amount of scrap produced, baling or briquetting would be uneconomical. It was pointed out that the break-even point for baling would be about 30 tons of scrap daily.

An observation of the cost differential, supplied at the meeting, on the use of the two different methods in these plants (demountable truck bodies versus collection bins at points of accumulation) was too small to warrant change.

The discussion then turned to the specific steps and procedures of scrap handling from primary generation to the point of accumulation.

One suggestion was the use of containers with wheels or casters, at each production machine, of a type that could be pulled away by tractor-trains. This would eliminate the manual hopper-loading operation, because the roll-away containers could be taken directly to the final scrap storage bins at the point of removal.

Another suggestion was the use of dumping buckets at the point of generation; these buckets would be picked up and taken directly to the final storage bins. An objection to this suggestion was the great distance of travel from the farthest point of generation to the final storage area.

An overhead conveyor system also was discussed, but the great distances involved plus the problem of continuous loading eliminated this as a practical solution.

Two other suggestions to eliminate loading at the point of generation were:

1. The installation of containers which would permit the scrap to fall directly into them. In the cases of power shears or punch presses, for example, the containers would be located adjacent to and flush with the table or bed of these machines. An objection to this suggestion was the variable heights that would be required of the containers.

2. The use of built-in, automatic conveyors, especially for small scrap, such as cut-outs or residue cuttings.

In conclusion, because of the low return for the scrap, it was decided that, 1. Probably the best plan of all would be to call in a scrap dealer and arrange to have him handle the removal of scrap at the points of accumulation, rather than at the final storage. This would obviate the need for special equipment and the extra man-hours required for the final handling operation, and 2. Further investigation as to reduced scrap handling possibilities at the point of generation was recommended as the most promising area of cost reduction.

What's Best Way to Get Scrap to Collection Point?

Problem presented by L. L. Poe, Supervisor, Production Control

JOB-SHOP OPERATIONS of the Falk Corporation, Milwaukee, revolve around the use of machine tools in the turret lathe and boring bar class. Metal chips and turnings resulting from these operations constitute the bulk of the scrap to be handled.

While there are various alloys involved, the total quantity to be handled is not sufficient to warrant segregation. Thus, the company's scrap handling problem resolves itself into only two phases: transferring the scrap from the point of generation to a central collecting point and, removal of scrap from the plant.

Under the present system, scrap accumulating over 2 9-hour shifts is removed from the chip pans during off-hours or lull periods. The scrap metal is shoveled by hand into dumping containers and the containers transferred to an outdoor dumping pit.

The dumping pit contents are transferred to a gondola once a week, using a mobile crane equipped with an electric magnet. This weekly accumulation rarely exceeds one carload (approximately 30 tons).

Problem: What method to employ to more effectively transfer the weekly accumulation of mixed scrap to a scrap dealer.

Solution: One manufacturer suggested the use of drop-bottom or roll-over type hoppers to be manually loaded from the chip pans and transferred by fork truck to the gondola for direct loading. In addition, it was proposed that scrap be accumulated in the self-dumping containers during the first three days of each week. Actual loading operations would take place during the last two days of each week when the gondola car is demurrage-free.

This would eliminate the necessity of a dumping pit for a central collecting station. However, not only would additional equipment be required, but a sizable storage area would have to be set aside to accommodate the three-day accumulation of loaded self-dumping hoppers.

The participants also mentioned that utilizing various attachments available for installation on standard fork trucks, scrap metal from the point of generation could be transferred to either a central collecting station or directly to the gondola.

It was the consensus that when daily scrap accumulation does not exceed 30 tons, daily removal is advisable. When the accumulated scrap is more than 30 tons, storage and periodic shipment by gondola is preferable.

Another suggestion involved the installation of a conveyor system to take chips and turnings from the machines to a local collection point. It was stated that more than 40 types of conveyors are available for as many different types of machines. One participant claimed that installations of this type eliminate downtime required for scrap removal, thereby increasing machine running time (and production) 15 to 20 per cent.

When the quantity of scrap is such that accumulation is desirable, a central collecting point is dictated. The conference participants felt that the demountable truck body is the most effective type of collecting equipment. For this particular plant, it was decided that a 10 cu yd container would be sufficient.

Such equipment is the property of this plant's scrap dealer and represents a minimum investment on the part of the disposer. These containers may be located wherever there are suitable approaches prepared for the equipment accumulating scrap from the point of generation. The scrap dealer removes the filled containers and immediately substitutes an empty one. For the disposer, there remains only a selection of the most effective means of delivering scrap to the demountable truck body.

As a result of the panel discussion, this particular firm decided that it should not store scrap for weekly removal in a gondola. It was felt that subject to some minor additional investigations, a system involving remountable truck bodies could be installed. This would require daily removal of accumulated scrap by the scrap dealer and eliminate the necessity of dumping-pit and gondola operations. At the same time, the crane mounted electric magnet could be released for effective duty elsewhere in the plant.

How to Speed It Up, and Keep It Clean

Problem presented by D. F. Redman, Plant Engineer

PROBLEM OF INTERNATIONAL Harvester Co., Chicago, is a civic as well as an industrial one. The plant covers approximately 20 acres in 33 separate buildings, some of which are multiple story. Refuse from these buildings is collected on four-wheel trucks. Sometimes, as many as 30 janitors are occupied in the collections, same making up to eight trips per day, others as few as one or two. The average distance traveled is about 1000 ft.

Truck loads of refuse are moved to gondola cars which are loaded manually. Loading is expedited by dropping an end of a gondola when it is empty, but as loading progresses, the end must be closed and refuse tossed over the sides. In trying to get as much material as possible into cars, flattened cartons are often used to extend the sides upward. When the refuse arrives at the gondolas, it is loose and bulky, and tends to blow out and scatter.

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The company determined that the refuse probably does not have enough value to justify separation into various types for sale. At one time, an incinerator was employed but due to great distances in hauling, the wasted time and excessive expense involved caused its discontinuance. Another deciding factor was the great deal of separation necessary to remove unburnable material.

Problem: Ways to speed up collections, speed up loading of gondolas, and eliminate the scattering of loaded material. Solution: Participants indicated that the problem could be solved satisfactorily through the installation of balers at several centralized locations and mechanization of delivery from balers to gondolas. Material could be hauled the comparatively short distances to the balers, baled, and then with considerably less frequency than is now necessary, hauled to the gondolas. As a result, the following advantages should result:

1. Fewer gondola cars would be needed, making it possible to reduce the number of carloads from the present one-per-day, to about one every other day, or less.

2. Fewer trips would be required each day to haul material to the gondolas, and faster hauling would save much time.

3. Scattering would be completely eliminated since there would be no loose material.

4. All types of refuse could be pressed in the baler, eliminating the expensive separation which was a drawback to incineration.

Another proposed solution involved a system utilizing water-tight containers with covers. The containers would be placed wherever refuse is collected, and loaded directly. For easy positioning, they could be mounted on wheels. They would be fitted with channels for fork truck handling, trucks would pick up the containers at the point of loading, and carry them directly to the gondola for emptying.

To eliminate scattering, the material might be pounded down, (probably with a weight on a crane) after being loaded in gondolas. There is a danger here, however, of compressing the material to a point where it becomes too solid for easy unloading. The proper amount of pressure would keep the refuse in the car but would not make it hard to unload.

In general, the conference delegates believed this problem could be solved conclusively, only after more data was presented for analysis. It was observed that the capital investment in the present system is low. On the other hand, labor costs are probably excessively high. A higher capital investment, a fork truck for instance, might cut the labor cost considerably. It appeared probable that the truck would lower costs enough to justify initial cost. Another suggested method for eliminating scattering involved the application of asphalt-base spray over the loaded gondolas.

Segregation of Scrap Is Problem Here

Problem presented by Lloyd Olsen, Assistant Superintendent

ROCKFORD DROP FORGE CO., Rockford, Ill., has already experimented with two methods for transferring its forging scrap—which must be segregated—from the shop into the gondola cars. Approximately 1½ cars of scrap must be handled daily. In their earliest method: scrap was hauled from the forge shop to scrap bins in the yard using an electric truck and large dump boxes. The scrap was placed in a designated bin and accumulated until a carload lot had piled up. At that time, the scrap was forked by hand onto a belt conveyor, and conveyed into the car. Scrap removed some distance from the conveyor was hauled to the conveyor in a wheelbarrow. This method was abandoned when a worker on the job suffered injuries, due to the strain of this heavy work.

The second system, now in use, is the same as the initial system up to the point where scrap is to be taken from the bins and put into gondolas. Now, they use a mobile crane equipped with a magnet, to lift the scrap from its

particular bin into the car. With this method, however, the magnet is damaging the concrete walls of the bins, in spite of the careful efforts of the crane operator. The walls have been broken down to such an extent that it is now difficult to keep the scrap segregated.

Solution: Several suggestions were offered by the group. It was proved that segregation of scrap would be advisable from an economical viewpoint. Also, it has been found that the scrap is bulky, not necessarily heavy.

It was suggested that perhaps a magnet-equipped overhead crane might be used. (The crane would extend over the bins and the railroad tracks). The questioning delegate replied that this system had been considered, since they felt that with this system the load is under better control and would result in less damage to the walls. However, this system was too expensive.

It was suggested that the bins be elevated, equipped with drop bottoms, so that the cars could be run underneath and loaded. During the discussion it was pointed out that although this would solve one problem, it would create another—that of loading the elevated bins. This suggestion too, was considered excessively expensive. The use of demountable truck bodies was considered. The truck bodies could be loaded by the fork trucks which bring the scrap from the forge shop. With this method, dealers might pay less for scrap in such small (8 to 10 cu yd) lots, than they would for carload lots. But, it was claimed, handling costs might balance this minor loss.

The question was asked: Is it not possible to load the gondolas directly—have the fork trucks dump directly into the gondola without the intermediate storage in the bins? It was pointed out that this would require a number of gondolas on hand at all times and this is not possible.

Next the use of mechanical loaders was discussed. These units could load from the bins without damaging the walls. After some discussion of loading difficulties, (filling the middle of the car, etc.) it was agreed that this was a possible solution. A discussion on using scrap storage boxes followed.

In this method, the scrap would be accumulated in the shop in a scrap box, the box carried by fork truck to the scrap storage area, and stored there in the boxes. Then, when a sufficient amount to fill a car had accumulated, the boxes would be dumped into the car by the fork truck equipped with revolvator. This would eliminate the necessity for a sturdy wall and require only a light fence to divide the area. It was pointed out that with this method, a good many boxes would have to be purchased, since in some cases, boxes of a particular kind of scrap might have to wait for weeks to be dumped (until a carload lot had accumulated). A discussion on whether the gondolas could be loaded evenly with this method followed — it was made clear that they could, and that this method is standard practice.

A modification of this system was suggested; that scrap be collected and stored in drop bottom boxes; dumped into the gondola from these boxes. Next the use of an orange-peel bucket instead of the magnet was mentioned. This was discarded as not having advantages over the magnet.

The delegate mentioned that they had considered using the present system, but replacing the concrete walls with a more flexible wall, constructed of rails and three-inch boards. This method, it was generally agreed, would not solve the problem, but rather put it in the category of a continuing maintenance problem. The delegate was asked if it would not be possible to enlarge the bins, giving the crane operator more room in which to operate. This was not possible.

In the final summary, the use of scrap boxes, in which the scrap could be collected in the shop and stored in the yard — and therefore eliminating walls in the yard—seemed to get the most favorable comment. It was suggested that the delegate make a cost comparison between continuing rebuilding of the walls and the investment in storage boxes.

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SELECTION, USE AND CARE OF TOOLS

Reamers—Various types are discussed and suggestions given for the use of each. Article also includes countersinks and counterbores

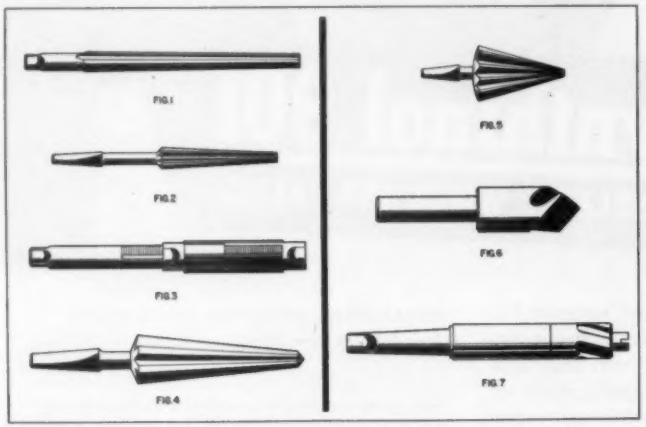
By THOMAS TRAIL, Maintenance Engineer

IN SELECTING reamers, the type of work to be done is an important consideration. Where general shop work is to be handled, a set of taper pin reamers is necessary. These, of course, are used to size and taper holes in machine parts to accommodate taper pins. Taper pin reamers, Fig. 1, are made in both straight flute and spiral flute types. The spiral flutes tend to cut with a shearing action, instead of the scraping action of straight flutes; however, the cost of a spiral flute reamer is higher.

Taper pin reamers taper ¼ in. per foot, and are so arranged that the small end of each succeeding larger size will start in the hole diameter left by the large end of the next smaller size. These reamers can be purchased singly or in sets, the sets being advantageous for shop work. For ordinary use the carbon steel type is satisfactory. The more expensive high speed steel reamers might prove advisable where reamers of this type are used frequently. Taper pin reamers have square shanks and are usually used with a tap wrench or similar handle.

The bit stock taper reamer, Fig. 2, is made in carbon steel type and has a taper of one inch per foot. It is provided with a bit stock type shank for use in a hand brace. These reamers also may be bought singly or in sets. The purchase of sets is advisable only if considerable use will be made of such reamers.

Reamers of the adjustable type, Fig. 3, with renewable blades, are useful for straight reaming of bushings, machine holes, etc. These reamers can be varied approximately 1/32nd in. in size in the smallest diameter to about 13/32nd in. variation in the largest size. They are furnished individually or in sets. This type reamer has a square shank.



Reamers, countersinks and counterbores play an important part in shop work

For general sizing or enlarging of holes in thin and medium thickness metal, the repairman's taper reamer, Fig. 4, is convenient. This reamer usually is available in three sizes, covering a range of approximately ⅛ in. to one inch. This reamer is made in carbon steel and has a bit stock type shank.

Where burrs must be removed from the cut ends of pipe, the carbon steel burring reamer, Fig. 5, is efficient. This reamer is made in straight flute and spiral flute types. The spiral flute type gives a shearing cut. Both types are made with bit stock type shank, and in sizes to cover pipe sizes from ¼ to 1¼ in. and ¼ to 2 in., respectively. The spiral flute type is also made in sizes to cover pipe sizes from ⅛ to ½ in. and ⅛ to one inch, respectively.

In using reamers, care should be taken not to force them to cut too heavily, though it is also important that they not simply rotate without cutting, as this may tend to dull them. The reamer should frequently be withdrawn and the accumulated chips removed, to prevent their clogging and jamming the cutters. It is generally not necessary to employ a cutting compound when reaming.

Countersinks, Fig. 6, are made in various lip angles for different purposes, such as screw head countersinking, rivet countersinking, etc. It is therefore necessary to select the type or types needed to take care of the work handled. Countersinks are made in several sizes of cut in the round shank style, and generally in one handy size in the bit stock pattern. They are usually made of carbon steel and hence should not be run at high speed.

Where it is desired to sink machine screw and bolt heads flush with the surface, a counterbore is required, Fig. 7. A counterbore of the interchangeable type shown will cover from 2 to 10 different sizes, depending on the size of the holder, by the use of interchangeable cutters. A variety of pilot hole sizes can also be covered by the use of various sized interchangeable pilots. High speed steel cutters should be employed for high speed counterboring. Counterbores are relatively expensive and hence should generally be purchased only in needed sizes.

Countersinks and counterbores are used in a similar manner to drills. Caution is necessary, however, to avoid cutting too deeply. It is therefore advisable to check the depth of cut from time to time, unless a depth gauge is employed.

Reamers, countersinks and counterbores should be handled the same as drills and taps, with care to protect their cutting edges, and they should be kept covered with a light oil film, to protect them from rusting.

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Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — Editors

YOU PAY NOTHING EXTRA FOR Amocel

...THE MAINTENANCE-SAVING PIPE INSULATION

Amocel for commercia luses—like famous Unarco higher-temperature Unibestos—is made from strong, resilient Amosite asbestos fiber. Designed for temperatures up to 600° F., it's a premium product in every way—clean appearance, long life, high efficiency—and it's easy to fit so you save from the first with this better insulation. Made in standard, 1½", and 2" thicknesses for pipe sizes from ½" to 12" in half-rounds with jacket and metal bands. Your Unarco Distributor has Amocel. Call or write for literature.

- UNHARMED BY MOISTURE, STEAM, OR FUMES
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- MAY BE REMOVED AND REUSED REPEATEDLY WITHOUT DAMAGE OR LOSS OF EFFICIENCY

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UNION ASBESTOS & RUBBER COMPANY

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PROGRESSIVE MECHANIZATION

— for More and Better Products at Lower Cost

THAT EVERY COMPANY is doing something to improve the mechanization of its operations is conceded by General Electric Company in announcing the latest program in its "More Power to America" series — "Progressive Mechanization." But too often that progress is painfully slow; the job is usually confined to operations that show a compelling need.

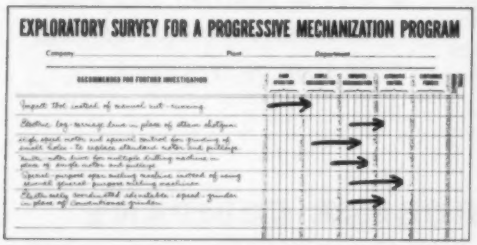
Heavy concentration on the "musts" and the "big ones" is letting many wasteful hand operations stay in existence and profitable opportunities are slipping by. The Company suggests putting every operation in the plant on trial . . . keeping all operations on the defensive . . . making them justify themselves against the challenge of doing things a better way.

Suggestions for launching such a program include: a meeting of key people to see the film, "Motors in Industry." Next, hand out copies of the manual and sample copies of the survey form. Third, set up a "Progressive Mechanization Committee." Then, after the committee has administered the survey, summarized the results and evaluated the more promising suggestions, it could set up a schedule of recommended projects with estimates of cost and dollar returns. Finally, after the initial phases of the program have been completed, the committee could continue to function as a permanent panel of "trial judges" who would review operations regularly.

The film, "Motors in Industry," so-titled because 86 per cent of all industrial horsepower is provided by electric motors, explains the concept of progressive mechanization in four step-up stages. It goes from hand operation to simple machine, from simple machine to improved machine, from improved machine to automatic control, and from automatic control to continuous process. Told through the medium of a professional methods engineer, the movie dramatizes mechanization by showing interesting and impressive examples that apply to all industries. Running time is 27 minutes.

Want More Information?

If you want a copy of this manual, or more information on the program package, simply write "Progressive Mechanization" on the postage-paid card (elsewhere in this issue), fill in the card and mail it.



EXPLORATORY SURVEY FOR A PROGRESSIVE MECHANIZATION PROGRAM

Company _____ Plant _____ Department _____

RECOMMENDED FOR FURTHER INVESTIGATION

Inspect: Use instead of manual visual inspection

Electric log recording time in place of slower dial type

Single speed motor and special control for grinding of small holes to replace obsolete motor and pulleys

Multi-motor drive for multiple drilling machine in place of single motor and pulleys

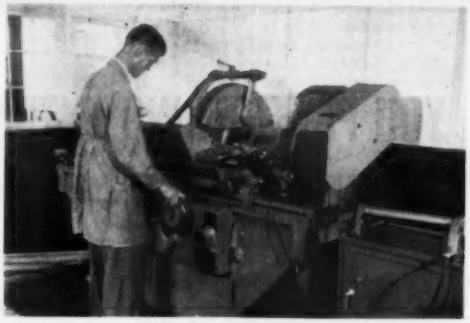
Special purpose open milling machine instead of using standard general purpose milling machines

Electronically synchronized alternating speed grinder in place of conventional grinder

The More Power to America Manual "Progressive Mechanization" suggests various ways of filling out this form and defines the various stages of progressive mechanization

STEP 1. Question every hand operation to cut manual labor to the minimum. Electric tools are an example

STEP 2. Investigate simple machines for replacement by units with higher speeds, more power, and multiple drives



STEP 3. Examine equipment with a view toward application of greater automatic control, adjustable speed drives

STEP 4. Combining several operations into a continuous process results in greatly speeded production as illustrated in this multi-process calender train

DARE TO COMPARE !

See the LIFE-LINESTARTER® STRIP-DOWN TEST for STEPPED-UP DESIGN

So simple you can disassemble it blindfolded.

The Simplest . . . Because of simplified design with fewer moving parts . . . because of easy installation with straight-through wiring and standard NEMA mounting.

The Toughest . . . Because of positive protection and rugged construction . . . patented De-ion® Arc Quencher—silver-to-silver contacts—Bi-metallic disc-type overload relay — Bonderized enclosure with baked, grey enamel finish.

Most Dependable Linestarter Ever Built! . . . A recent chemical-plant-test* showed: "Four starters began our life test. Only one finished, the Life-Linestarter. Contact wear was negligible." J-30097

**Name on Request.*

You can be SURE . . . if it's Westinghouse

Life-Linestarter

SEE THE STRIP-DOWN TEST AT NO OBLIGATION!

It will open your eyes to Life-Linestarter's Stepped-Up Design and Performance. Mail the coupon today!

Westinghouse Electric Corporation
Box 868, Pittsburgh 30, Pa.

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Immediate delivery from stock!

When buying gauges ask for USG . . . where a most diversified stock awaits your selection. USG Gauges are stocked for your convenience. You can order any of a wide variety of instruments—233 types, dial sizes, and size ranges—without delay. Many of these gauges are obtainable immediately from the local stock of distributors of USG Gauges in principal cities throughout the United States. Or they may be ordered through your USG distributor directly from factory stock at Sellersville, Pa. Take advantage of this fast delivery service. Call the distributor of USG Gauges in your locality today for information on gauges. United States Gauge, Division of American Machine and Metals, Inc., Sellersville, Pa.

Three of the many types and sizes of USG Quality Gauges now carried in stock

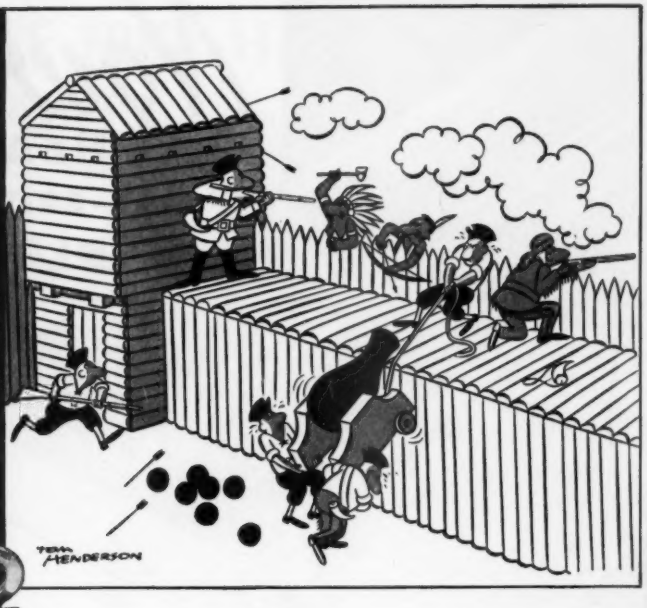
UNITED STATES GAUGE

Quality Gauges Engineered for Enduring Accuracy

PRODUCTS OF UNITED STATES GAUGE... Absolute Pressure Gauges • Aircraft Instruments • Air Volume Controls • Altitude Gauges • Boiler Gauges Chemical Gauges • Mercury, Gas, and Vapor Dial Thermometers • Glass Tube and Industrial Thermometers • Flow Meters • Inspectors' Test Gauges Precision Laboratory Test Gauges • Marine, Ship and Air-Brake Gauges • Voltmeters • Ammeters • Welding Gauges.

OTHER DIVISIONS OF AMERICAN MACHINE AND METALS, INC. AT SELLERSVILLE, PA.: GOTHAM INSTRUMENTS, AND AUTOBAR SYSTEMS

There's a YALE hoist for *every* lifting job!



Eliminate Hoist Downtime

with the YALE Cable King Electric Hoist. *Exclusive* Cable King Positive Load Brake Lubrication minimizes heat created by friction. And the *exclusive* Cable King Cooling System circulates air into all parts of the Braking Mechanism. Result: A Hoist that gives you continuous day-long, top-speed service.

CAPACITIES:
¼ to 12 Tons

TO TAKE operating costs off the firing line . . . bring your lifting problems to your YALE Distributor. For a YALE Hand or Electric Hoist can save manpower and increase production on every lifting job.

Your YALE Distributor can give you valuable help in choosing the right hoist for your special needs—from the world's most complete line of hoisting equipment. He will recommend the modern, dependable YALE Hoist designed to solve your particular problems. Look for your local YALE Distributor in the Classified Directory. Or mail the coupon below.

YALE & TOWNE

MAIL THIS COUPON TODAY

The Yale & Towne Manufacturing Co., Dept. 477
Roosevelt Boulevard & Haldeman Ave., Philadelphia 15, Pa.

I'm interested in lifting for less with a YALE Hoist.

☐ Please have your local Distributor call on me
☐ Please send detailed literature on ☐ YALE Hand Hoists ☐ YALE Electric Hoists

Company.....

Name.....Title.....

Street.....

City.....State.....

In Canada write: The Yale & Towne Manufacturing Co., St. Catharines, Ont.

YALE is a Registered Trade Mark of The Yale & Towne Manufacturing Co.

YALE HAND AND ELECTRIC HOISTS • YALE GAS AND ELECTRIC INDUSTRIAL TRUCKS • YALE WORKSAVERS • YALE HAND TRUCKS • YALE PUL-LIFTS

Now!

HEAVY-DUTY DAY-BRITE CONSTRUCTION PLUS CFI*

*COMFORT FOR INDUSTRY

These scientifically designed *aperatures* make the difference—give the ideal 10% upward component of light.

. . . the first practical answer to industry's need for comfortable lighting

Number one consideration in industrial lighting has always been rugged, durable construction . . . often at the expense of comfortable illumination. But in the past Day-Brite has consistently demonstrated that highest standards of lighting and highest standards of construction can be combined.

Now, after two years of research and study, we're ready to announce *another* great advance in industrial lighting.

To give industry even more comfortable and vision-saving illumination, Day-Brite has completely redesigned its famous Day-Line industrial line. The new CFI Day-Line is *comfort* engineered to give 10% upward light distribution and put an end to the harsh brightness contrasts and dark ceilings that hamper workers.

Now, workers can enjoy freedom from irritation and nervous fatigue due to eyestrain. Now, management can reap the benefits of more production, less work spoilage, higher employee morale and lower accident rate.

All the familiar Day-Brite features are still there, of course—die-formed heavy gauge steel construction, porcelain enameled reflectors, vibration-proof Turret sockets. And yet, CFI Day-Line prices are actually lower . . . actually mean substantial savings on industrial lighting installations.

See the Day-Brite distributor nearest you. Get the facts about this newest advance in plant lighting. Day-Brite, Inc., 5439 Bulwer Avenue, St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

248

IT'S EASY TO SEE WHEN IT'S "DECIDEDLY BETTER" DAY-BRITE Lighting Fixtures

ADJUSTABLE PIPE HANGERS AND SUPPORTS

for every piping requirement

NO. 4 OF A SERIES SHOWING THE GRINNELL LINE

BRACKETS, HOOKS, CLAMPS for attachment to walls, columns and beams

Light Welded Steel Bracket
fig. 194
max. load: 750 lb.

Medium Welded Steel Bracket
fig. 195, max. load: 1500 lb.
heavy welded steel bracket
fig. 199, max. load: 3000 lb.

Side Beam Bracket
fig. 202
load: 150 to 2300 lb.

Side Column Bracket
fig. 203
load: 150 to 390 lb.

Cast Iron Bracket
fig. 223
load: 610 lb.

Cantilever Bracket
fig. 221
with angle iron ext.
fig. 222

Single Hook
fig. 168
½ to 3 IPS

One Hole Clamp
fig. 126
⅜ to 4 IPS

FLANGES, CLIPS, HOOKS for attachment to the ceiling

Adj. Swinging Hanger Flange
fig. 155, for ⅜ to ⅞ in. rod
flange only
fig. 156, for ¾ to 12 in. pipe

Swivel Hanger Flange
fig. 154
for ⅜ to ⅞ in. rod

Pipe Hanger Flange
fig. 153
for ⅜ to ⅞ in. rod

Ceiling Flange
fig. 128
for ½ to ¾ IPS

Adj. Clip Base
fig. 116
for ⅜ to 2 in. pipe
⅜ in. rod size

Wrought Clip, Long
fig. 263
short: fig. 262
½ to 4 in. pipe

Tin Clip
fig. 231
¼ to 2 in.

U Hook
fig. 205
¾ to 8 in. pipe

Call Your Local Grinnell Distributor or write for Hanger Catalog.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

1—LIQUID INSECTICIDE gets into bugs' hides n' hideouts

Vaposector is a highly concentrated liquid which operates on the principle of "double penetration." It is formulated to penetrate even remote crevices and hiding places, then, just as easily penetrate the insect's outer covering attacking the central nerve and respiratory systems to inflict a paralysis from which the pest doesn't recover.

Vaposector is dispensed with manufacturer's specially designed equipment, and a turn of the valve transforms the liquid into a fine mist. According to company, only 1 oz is needed to control flying insects in 1000 cu ft of space, and 2 oz for crawling insects in the same area. There is said to be no toxic peril when used according to directions, because Vaposector doesn't affect persons or warm-blooded animals. West Disinfecting Co.

2—DRILL ATTACHMENT for cutting all thin metals

Latest in handy attachments for this manufacturer's electric power drills is the Nibbler, said to be ideal for artistic metal cutting, scalloping and similar

intricate jobs. It is designed for cutting all kinds of sheet steel, brass, copper or fibre, up to 19 gage (0.04). Width of cut is ⅛ in. Company says the Nibbler assures exactness and smoothness in metal cutting with minimum effort. A highspeed punch type cutter attachment, it operates with ¼ in. capacity standard or heavy-duty electric drill, at speeds from 800 to 3500 rpm. Mall Tool Co.

3—PANELBOARD for lighting, appliance circuits

The PB Electri-Center is a general purpose circuit breaker panelboard, rated single-phase three-wire, or three-phase four-wire, both solid neutral, 120/208 v a-c with 100 amp main wire grips. Available in 14- or 20-circuit sizes, these panelboards are merchandised to distributors as "basic devices" containing box, interior, two 15-amp breakers and two 20-amp Pushmatic breakers, which require only a push of the button to operate. Extra breakers, filler plates and fronts (flush and surface) are supplied at time of purchase to suit plant's specific need. BullDog Electric Products Co.

Use the postage-free cards on pages 35-36 and 141-142 to ask for more information on these products. List item numbers of those products in which you are interested.

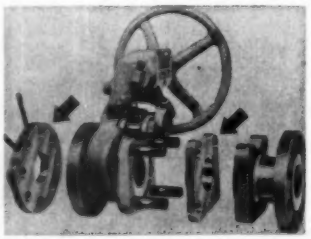
4—PORTABLE FURNACE furnishes heat and cool air

The Dual-Purpose Model 189 is an improved portable unit which, in addition to furnishing heat in winter, circulates cool air in summer. It is designed to deliver 189,000 Btu per hour (49,000 Btu more than capacity of previous models). Heat is sprayed out at the floor level over an area of approximately 3000 sq ft. This heat is said to be concentrated in a work zone 6 ft high. Fageol Heat Machine Co.

5—HEATED VALVES are for low temperature applications

Announced as the first commercially successful electrically-heated valves, these are designed to keep valve mechanisms clear of frost and ice in liquid CO_2 lines at temperatures down to -110 F. Other applications being developed include both hot, cold and viscous liquid and gas lines, as well as uses where heated valves were formerly economically impractical.

Single-disc valves require heating element shown at right. Double-disc valves can be equipped with both elements. Heat from the elements is transmitted directly to valve seats,



company says, and thus heat the entire flow opening in addition to the operating mechanism. Valve sizes from 2 to 6 in. are available with pneumatic, hydraulic, solenoid or manual control. Heating elements can be provided for 110- or 220-v operation. Okadee Co.

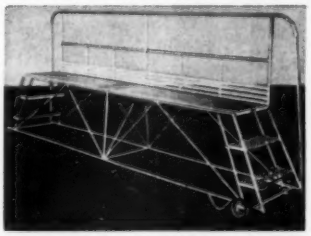
6—UNIT WORK BENCHES offer unusual storage space

Newest additions to company's Hallowell line of shop equipment are the 640 Series Unit Work Benches, which can be used as continuous benching or single work stations. Their big storage facilities permit uncluttered tops.

The new benches come in three basic models. Model 640 is made up of a top, two pedestals (drawer unit and cabinet unit), and two bases. Model 643 includes a top, two drawer units and two bases. Model 646 is assembled with top, two cabinet units and two bases. Tops are steel, Presdwood-covered steel or laminated wood, and come in 5-ft and 6-ft lengths, in nominal 24-in. and 30 in. widths. For continuous benching they can be butted end to end or joined with two tops on the same pedestal. Standard Pressed Steel Co.

7—PORTABLE PLATFORM for maintenance, production

All-steel welded tubing and expanded metal treads and platform are used to provide safe footing and ample space



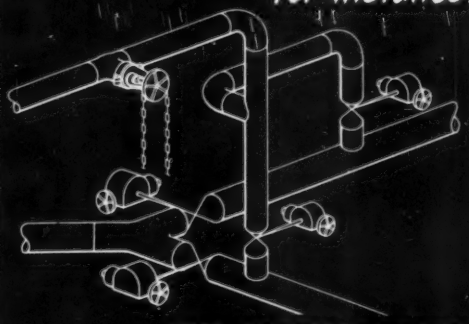
for both tools and workers on these portable platforms. They're built to order to meet requirements for length, height, width and rail construction. Manufacturer says they're rigid and sturdy and their use eliminates need for makeshift platforms and heavy, hard-to-move structures. Designs and prices available. Ballymore Co.

8—LUBE OIL is fortified to extend engine service life

Rimula Oil is said to feature a combination of additives never before attained on a commercial basis and to substantially extend the serviceable life of industrial and materials handling trucks, gasoline engines operating in intermittent type service, and certain industrial automotive type diesel engines. Tests are reported to show that

Can You Rate Your Valves This Well?...

on Main Steam Service for instance



THE INSTALLATION

VALVE SERVICE RATINGS

MAINTENANCE COST:	None to date
FEATURES:	Highly practical Pressure-Seal design
SUITABILITY:	Eliminates bonnet joint leakage
SERVICE LIFE:	Now more than 4 yrs.
PRICE:	In line for this modern design
AVAILABILITY:	Regular item in Crane line

Crane Pressure-Seal Gate Valve on 8-inch main steam lead to house turbine. Steam conditions: 850 psi at 900 Deg. F. Southwark Station, Philadelphia Electric Co.

THE HISTORY

This valve was installed on a trial basis in the station's last extension program. In service now more than 4 years, this 900-Pound Crane Pressure-Seal Bonnet Gate Valve has completely eliminated any need of bonnet joint maintenance. Under constant high pressure/high temperature conditions, it remains perfectly tight at bonnet and stem; needs no costly attention.

Never, says the customer, does this Crane valve stick at the disc, even though operated infrequently. Its operation is as smooth and positive today as when first installed. As a result of this performance, the customer is continuing to specify Pressure-Seal type valves.

THE VALVE

Universally recognized for simplified development of the modern pressure-seal bonnet principle, Crane Pressure-Seal Gate Valves combine many added refinements. For example, their highly compact, weight-saving design reduces erection costs; streamline body contouring saves insulating labor and material. See your Crane Catalog or Crane Representative for complete details on these valves—in gate, globe, angle, and stop-check patterns; in 600, 900, and 1500-Pound pressure classes.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

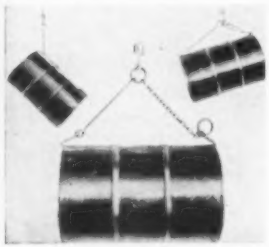
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

this highly fortified oil cuts down engine wear from corrosion and fouling, with consequent reduction of oil consumption and frequency of overhauls.

Rimula Oil was developed to solve certain problems of engine wear and fouling caused by operating conditions involving low loads, high sulfur fuels and intermittent service. Company says that in many plants the higher first cost of this oil is offset by extended serviceable engine life through elimination of ring sticking and piston lacquer. Technical data on Rimula Oil are available. Shell Oil Co.

9—SLING for lifting those drums and barrels

While loading and unloading trucks and general purpose handling are the main uses for this



drum and barrel sling, it will also drain drums. Handles anything with a lip—kegs, steel drums or wooden barrels—and has a 1000-lb capacity. The Palmer-Shile Co.

10—CLAMP for fork truck handling of cartons

Designed to provide efficient, low cost unpalletized handling of a wide variety of different size

cartons, this attachment has arms articulated to equalize pressure on cartons being lifted. An adjustable regulator on the hydraulic system governs the pressure adjustment, as determined by the weight of the cartons. This regulator also serves to prevent crushing of the cartons. The Yale & Towne Mfg. Co.

11—ROLLER CHAIN with oil impregnated bushings

This new roller chain has oil impregnated metal bushings and is claimed to require little or no lubrication. It is designed to meet the need for a chain drive that will operate efficiently where conventional lubrication methods are either not possible or not desirable as, for example, in the textile industry where the use of drives requiring external lubrication could damage the fibres or textiles by oil spotting.

Tests of the new chain are reported to show greatly increased service life over standard roller chain pre-lubricated according to best practice. At present, production is limited and restricted to certain sizes, and application is subject to engineering approval of manufacturer. Further information on this chain is available on request. Whitney Chain Co.

12—AIR LINE FILTER features replaceable bowl

This new filter for removal of corrosive moisture, abrasive pipe scale and other foreign matter from ¾ in. and 1 in. compresssed air lines is for use on flows up to 140 cfm at pressures to 150 psi and temperatures between 40 and 120 F.

The transparent bowl, which holds 1 pt below the baffle, lets operator see when to open the drain cock. The filter is automatic and has a baffle plate which acts to trap moisture and solids in the bottom of the bowl, keeping them from being drawn back into the air line. Filter elements available include reinforced Monel screen or sintered metal. C. A. Norgren Co.

13—SWITCH for locations subject to immersion

The Type 4HS is announced as a waterproof snap-action switch incorporating waterproof terminal leads and hermetically sealed contact chamber, and is designed for use where moisture, dirt or other environmental conditions could damage, reduce the capacity, or short the terminals of many switches. The waterproof leads—of any required length—are connected to the terminals of this switch. and potted in a high-dielectric plastic which seals terminals and leads. Leads can be supplied with waterproof couplings.

The metal case is sealed at the top by a metal diaphragm through which the external actuating lever operates. Switch is available with single-pole, single-throw, or double-throw contact arrangement. Micro Switch.

14—MASONRY COATING is oil base two-purpose paint

Mason Coat 310 is a one-coat paint for both decoration and protection against moisture infiltration. Manufacturer says it is applicable to both interior and exterior surfaces of concrete block, cement, brick, stucco, asbestos cement siding. It may be applied by brush or spray over new or previously-painted surfaces, and being elastic it is said to withstand severe weather, temperature changes. United Laboratories, Inc.

15—PIPE WRENCH with ratchet action for close work

When this pipe is gripped, the handle is parallel to the jaw faces, permitting its use on pipes in corners and other

hard-to-get-at spots. According to manufacturer, the turning leverage is always constant regardless of the size of the pipe. Another important feature announced for this wrench is its ratchet action—after a turn, the wrench releases itself and automatically returns to its original position ready for another grip. The wrench costs $13.50—a specification sheet giving more details is available. Lurie & Lurie.

16—BRAZING ALLOY is paste with low melting point

Phos-Copper in free-flowing paste form is available for brazing operations on copper and copper alloys. An alloy of copper and phosphorous, its fluidity and wetting properties provide good capillary action that enables it to penetrate tight fitting joints to form a strong, ductile bond, company explains, and on most copper jobs no flux is needed.

The new paste consists of finely powdered Phos-Copper suspended in a petroleum jelly. A little of this paste between the pieces to be joined takes the place of a brazing rod and the joint need only be heated until the brazing filler metal flows. It is designed for resistance brazing where it can be conveniently pre-placed, and is packaged in 1-lb tubes and in 5- and 10-lb cans. Westinghouse Electric Corp.

17—POWER SWEEPER for all floors and pavements

In addition to continuous duty equipment which includes side-sweeper, floodlight, tail light, side spotlight,

horn, battery case and switches, the new Model 1000-S Sweeper has a self-starter motor, storage battery and generator. Transmission is automotive

(Continued on page 132)

when you want a direct answer

. . . to your direct current motor problems, look to your nearby Fairbanks-Morse Electric Motor Specialist.

He is technically qualified to help you select the equipment exactly suited to your D.C. needs.

Whether you are interested in a D.C. or A.C. motor . . . one or a thousand—one type and size, or a variety of types and sizes . . . you'll find that motors carrying the Fairbanks-Morse Seal are designed and built to your most rigid requirements.

When you look for electric motors—for standard or unusual applications—*always* look for the Fairbanks-Morse Seal. For over 120 years it has stood for the finest in manufacturing integrity to *all* industry. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES
HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

V. G. MOORE of PORTLAND, OREGON, SUBMITS WINNING IDEA IN CONTROL DERBY

Mr. V. G. Moore, chief electrician for the Commission of Public Docks in Portland, Oregon, writes in about a unique control system, utilizing two Honeywell products, for the compensation of plugged hoses and nozzles during the unloading of grain ships. Mr. Moore won a Honeywell Electric Clock Thermostat for his report of the application.

The grain is unloaded from ships' holds by suction hoses, is carried to a receiver cyclone and then to a feeder which puts it on a conveyor belt to the elevator.

Time-consuming delays were being caused by frequent overheating of the 200-horsepower electric motor which drives the suction blower. The overloading of the system resulted from careless handling of the nozzles and suction hoses.

With the help of Honeywell engineers, a control system was devised . . . using a butterfly valve to admit atmospheric pressure to compensate for the plugging (operated by a Honeywell *Modutrol* motor of the proportioning type) and a Honeywell Pressure Controller unit to sense the pressure in the receiver cyclone.

As a result, the amount of vacuum, and thereby the load on the motor and the maximum rate of movement of the grain, is now predetermined and fixed. According to Mr. Moore, the system has been highly successful in its operation and results.

Honeywell Pressure Controller

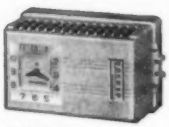
NEWSPAPER FOR PLANT ENGINEERS ANNOUNCED

Honeywell's Industrial Division now has a periodic publication—*Industrial Control News*—which contains detailed information on many new and unusual applications for automatic controls throughout industry. In its pages, production and maintenance men tell how they are reducing costs and increasing operating efficiency on all types of equipment. According to a release from the company, anyone interested in industrial controls can contribute to *Industrial Control News* . . . and can receive copies . . . by sending name, company, title and address to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Station 70, 4581 Wayne Ave., Philadelphia 44, Pa.

do you have an "IDEA" for the

Honeywell Industrial Control IDEA DERBY?

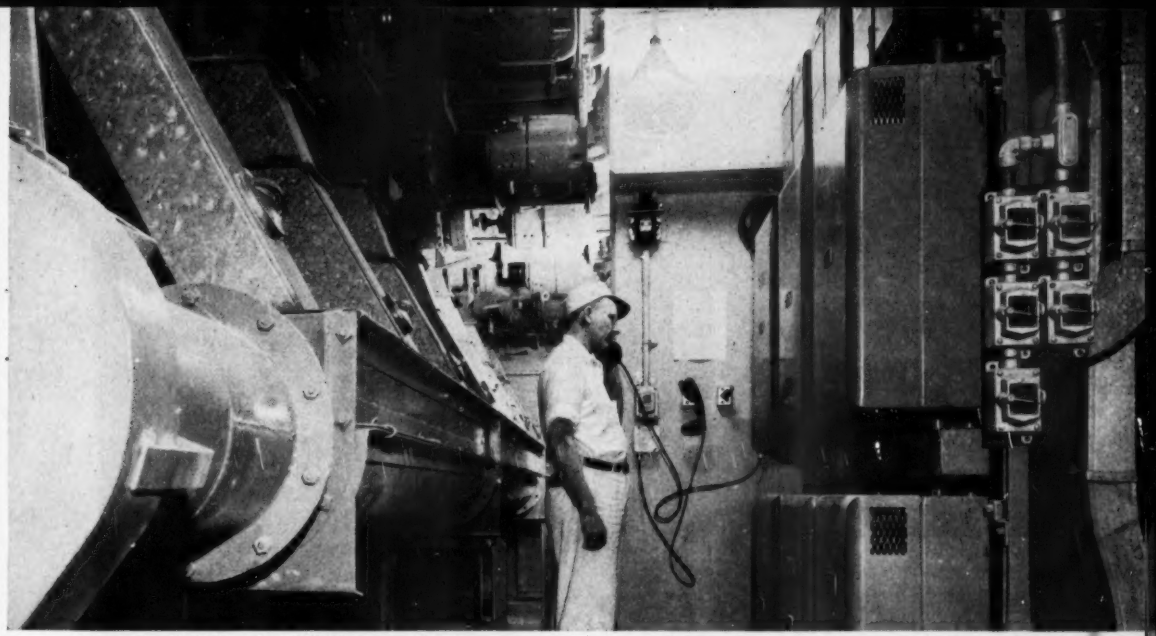
Just send us a sketch and description of how a non-indicating control is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! An impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a Honeywell Electric Clock Thermostat. All material submitted becomes the property of MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Phila. 44, Pa.



Win a **HONEYWELL ELECTRIC CLOCK THERMOSTAT**

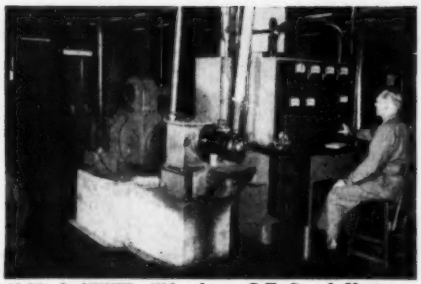
MINNEAPOLIS **Honeywell**

First in Controls



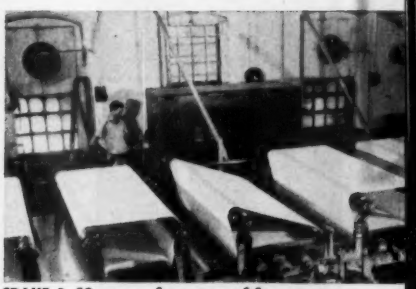
GENERAL MILLS, INC. picked G-E *Thy-mo-trol** drives to proportion and control flow rate of flour. They wanted stepless, very accurate, electronic speed control over a wide range, plus quick, easy operation. The answer: *Thy-mo-trol*, available in ranges to 100:1 and more, ¼ h.p. and up. Above, operator gets orders over phone, sets drive speed quickly by turning dial.

Why four plants chose four different G-E Adjustable-Speed Drives!



JACK & HEINTZ, INC. chose G-E *Speed Variators* because they wanted to increase production with rotating, adjustable-speed drive that could be operated from centralized control—still maintain good quality over a wide speed range.

◀**BUTTERICK CO. INC.** found G-E *ACA Motors* ideal for varying speeds over moderate range for offset presses. Here is the simplest, low-cost way to get stepless, adjustable-speed drive with a-c power, contains motor, control in one compact unit.



CRANE & CO., manufacturers of fine paper, selected G-E *Electronic Speed Variators* for paper machines—needed a 40 h.p. adjustable-speed drive that maintained rigid quality control, automatically, 24 hours a day, six days a week.

GENERAL ELECTRIC CO. is the only manufacturer making *all major types* of electric adjustable-speed drives to help you speed output, raise quality. Write for 24-page *Bulletin GEA-5334. General Electric Co., Schenectady 5, N. Y.* 646-18

*Reg. Trade-mark of General Electric Co.

GENERAL ELECTRIC

MOST ACCLAIMED

manual starters among maintenance men

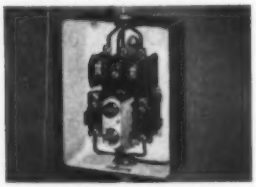
Bulletin 609

Easy to Install and Maintain

Quick fastening to wall. Handy wiring diagram inside cover.

Complete data for selection of correct overload breaker.

Generous wiring room. Numerous conduit knockouts. Bright white interior.



Bonderized for protection against corrosion. Hard baked enamel finish.

Easy to slip on cover . . . tight fit to prevent vibration . . . fastens securely.

Bulletin 609 hand operated starters are the recognized standard for starting and stopping small a-c motors.

You will appreciate these outstanding features: No Contact Maintenance—The large double break, silver alloy contacts never need cleaning, filing, or dressing • Quick Make and Break—A simple toggle opens and closes the contacts with a snap action, preventing contact burning • Reliable Overload Protection • Small Size, in spite of high current interrupting capacity • Easy to Install—Lots of wiring room, terminals accessible from front and knockouts on all sides of cabinet • Bonderized Enclosure to prevent corrosion • Trouble Free Service—Millions of these starters in operation testify to their satisfactory performance.

Allen-Bradley Co., 1317 S. First St., Milwaukee 4, Wis.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

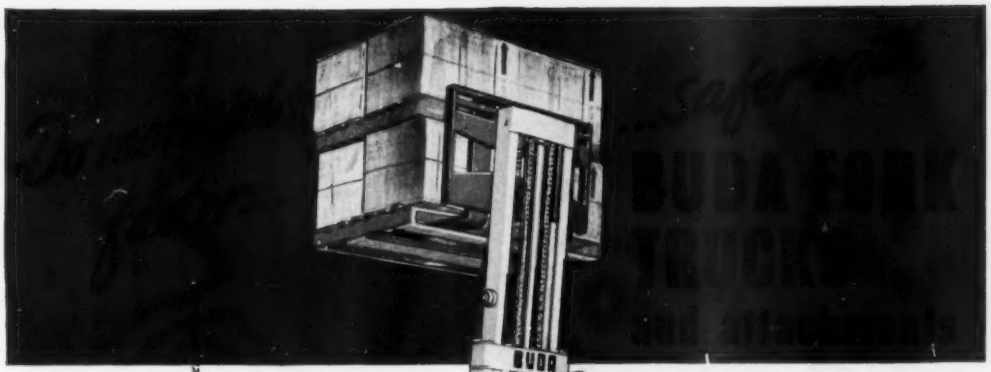
An Enclosure for Every Service

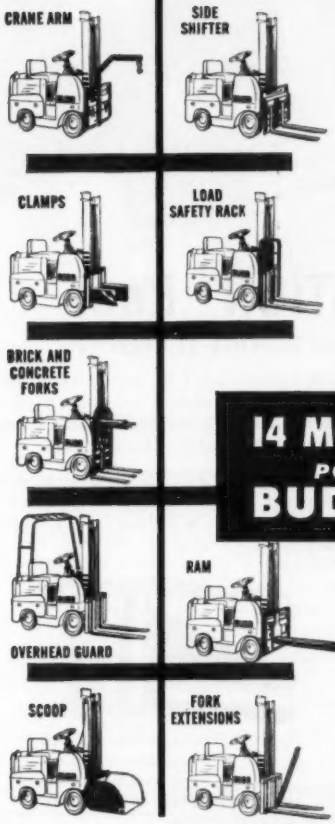
General Purpose

Watertight

Explosion Proof

A-B Quality





14 MODELS... CAPACITIES TO 7,500 LBS.

POWERED BY HEAVY-DUTY INDUSTRIAL

BUDA DIESEL OR GASOLINE ENGINES

Never before have you been able to get more handling efficiency, lower operating costs, less maintenance, greater safety, and long useful life than are now offered you by the Buda FT Series fork lift trucks. Completely new—from their special section mast down to the reinforced "U" channel frame, Buda "FT" Series embody the most advanced engineering, functional design and modern styling. Powered by heavy-duty industrial Buda Diesel or gasoline engines.

Equipped with a wide variety of attachments to save time and cut costs on many special handling jobs, Buda "FT" Series Fork Trucks may very well be the answer to your material handling problems.

Don't overlook the additional advantages of Buda Diesel power as explained in Bulletin 1570. Write for it today. See your nearby Buda Distributor for complete details and demonstration. *The Buda Company, Harvey, Illinois.*

BH-41

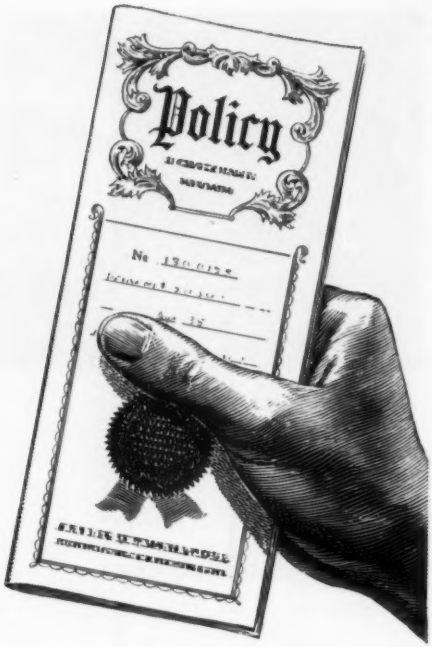
The Line with All 3 for Diversified Handling

TOWING TRACTORS | CHORE BOYS | FORK TRUCKS

BUDA

Manufacturers of Material Handling Equipment, Lifting Jacks, Maintenance of Way Products, Earth Drills and Diesel and Gasoline Engines

Your Best Over-all Policy:



A Barrett SPECIFICATION* Roof

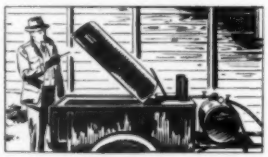
No premiums to pay! Dividends in protection! Benefits of security!

When you specify a Barrett* Bonded Roof you have the assurance of the best built-up roof that money can buy. The superiority of a Barrett "SPECIFICATION" Roof is due to the combination of highest-quality roofing materials and scientifically-standardized application techniques based on almost a century of roofing experience.

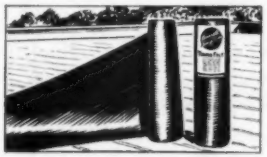
Barrett* pitch and felt meet the exacting requirements of Federal, A.S.T.M., and A.R.E.A. specifications—and when applied according to Barrett application methods are given a Class A rating by the National Board of Fire Underwriters.

A Barrett "SPECIFICATION" Roof is bonded against repair for periods up to 20 years—a roof *so good* that it regularly outlasts the bonded period by many years.

The famous Barrett Armored Surface of a triple-thick coating of pitch plus a top layer of gravel or slag assures extra protection against mechanical damage and fire.



Barrett pitch contains vital oils that are preserved by the very moisture to which it is constantly exposed. For nearly a century it has been recognized as an unexcelled waterproofing agent.



Barrett carefully produces felt from selected stock and then saturates it with a coal-tar saturant to provide a uniform, tough base for the intervening layers of pitch.

Barrett Specification Roofs*

*Reg. U. S. Pat. Off.

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ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

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For Air Conditioning Economy...

Systematic replacement with DUST STOP* AIR FILTERS

FIRST for air conditioning economy is regular servicing of equipment—by a reliable outside service or your own men. **SECOND** is filter selection. Fiberglas DUST-STOP* Air Filters provide a money-saving combination of greater effectiveness—longer life. A special fiber diameter (not so fine that it causes face loading—not so coarse that it allows poor filtering) lets DUST-STOP Filters trap virtually all common dirt, with minimum air resistance. A special non-drying adhesive assures continued dirt-catching efficiency—extends filter life.

When DUST-STOP Filters are replaced systematically, you are assured of low operating cost—high cooling performance.

Save money on filters The "Comparative Study of Air Filtering Costs" helps you figure your costs to the penny. Get a copy from your local filter supplier or Fiberglas Branch Office. Or mail coupon.

OWENS-CORNING
FIBERGLAS

DUST STOP* AIR FILTERS

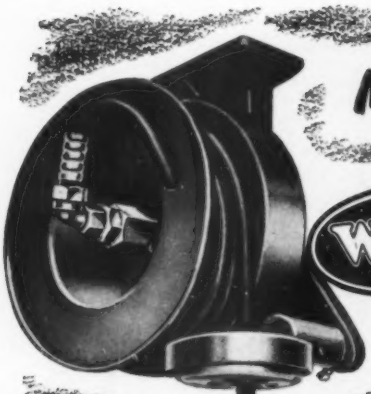
*FIBERGLAS and DUST-STOP trade-marks (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.

Owens-Corning Fiberglas Corporation
Dept. 95-G
Toledo 1, Ohio

Gentlemen: Please send me a copy of your "Comparative Study of Air Filtering Costs in Central Systems".

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

MORE PRODUCTION Per Worker With Wayne Industrial Hose Reel



AIR SUPPLY AND TOOL SUSPENSION COMBINED IN EASILY-MOUNTED REEL

Wayne Industrial Hose Reels can boost job output, help reduce assembly costs and lessen worker fatigue in your plant. Air supply and tool suspension are combined to give greater working radius, and "spot" air supply for tools.

Air tool is within easy reach at all times. No cables or dangerous loops of hose to cause accidents. Hose is completely protected on Reel when not in use.

Spring tension of Reel counterbalances air tool. Ratchet holds hose at any desired length until released by a short forward pull. Then hose automatically rewinds on the Reel. Automatic braking prevents whipping or lashing action. Reel can be mounted in many convenient positions.

Find out how Wayne Industrial Hose Reels will fit into your production picture profitably.

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND

Wayne

NATION WIDE SERVICE

INDUSTRIAL HOSE REELS

FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS

"Our *Powermaster* Boilers are dependable, efficient, easy to service, and economical to operate"

William H. Wagner
Plant Engineer
Blue Bird Silk Mfg. Co.

Alfred J. Sidler
Plant Manager
Blue Bird Silk Mfg. Co.

20% Saving in Steam Cost at York, Pa. Manufacturing Plant

William H. Wagner, Plant Engineer of the Blue Bird Silk Manufacturing Company, knows the problems of generating high-pressure steam 24 hours a day, 365 days a year. And he knows how serious it can be for a busy manufacturing plant if there is trouble or failure in the boiler room. That's why, two years ago, the company replaced their old-fashioned coal-fired boilers with two 200 h.p. POWERMASTER packaged automatic boilers, burning #6 (Bunker C) oil. Here is what they found:

- The cost of producing steam for processing and heating dropped 20%.
- The steam produced now is much dryer.
- The POWERMASTERS respond very rapidly to variations in load.
- Maintenance has been negligible.

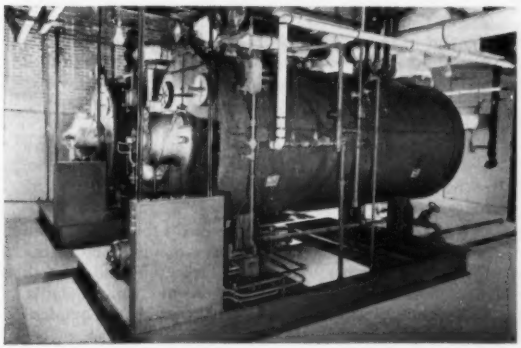
Little wonder that Alfred J. Sidler, Plant Manager, says, "If we had it to do over again, we would certainly buy POWERMASTERS."

No other packaged automatic boiler gives you *all 3 advantages of the Powermaster:*

1. SAVE FUEL—because the special *Powermaster* burner design gives you top efficiency when operating anywhere between 30% and 100% of capacity.
2. SAVE IN MAINTENANCE and clean-up time. Complete combustion of fuel gives practically smokeless and carbon-free operation. The burner has *no* moving parts to wear out . . . or to be cleaned daily.
3. CHANGE FROM OIL TO GAS (or gas to oil) in just a few minutes. Burn light oil, heavy oil, or gas—whichever is cheaper. You no longer need depend on one source of fuel supply.

Write for this Catalog

To get complete information about this modern packaged automatic boiler for steam or hot water, write for *Powermaster* Bulletin 1218. We'll be glad to put a copy in the mail for you.



These 200 h.p. POWERMASTER packaged automatic boilers have been operating round-the-clock for more than two years at the Blue Bird Silk Manufacturing Company, York, Pa. Burning #6 oil, they produce a total of 13,800 pounds of steam per hour.

Powermaster®

PACKAGED AUTOMATIC BOILERS

In sizes to 500 h.p.; pressures to 250 psi.

ORR & SEMBOWER, INC.

Established 1885

840 Morgantown Road, Reading, Pa.

News From the Plants

Three-Way "Ceiling" for Lighting, Acoustics, Ventilation

The totally-luminous ceiling was under development by this manufacturer in the 1940's as a lighting source to give even distribution of controlled light from wall-to-wall, while Massachusetts Institute of Technology was working independently toward the same end. In 1950 this all plastic ceiling, hung from lighting channels on the true ceiling above it, evolved from the experiences of M. I. T. and The F. W. Wakefield Brass Company, Vermilion, Ohio. Acoustical controls suspended below the ceiling were a part of the evolution.

By 1951, installations had shown that the completely-luminous ceiling had a use beyond furnishing glare-free lighting and reverberation control. The plenum space above was already being used to distribute air for warmth or cooling. Studies at Case Institute of Technology last summer proved the ceiling's effectiveness for distributing air, through the corrugations at the ends of the plastic sheets, with no drafts upon room occupants.

The photograph shows the Wakefield Ceiling installed in an Engineering and Display conference room. It is designed to deliver 60 footcandles of well diffused large area low brightness light on the models and samples displayed. The ceiling is so designed that additional illumination can be provided at a later date if desired. Approximately 1,005 square feet of ceiling are installed.

Fiberglas Tapes Help Make Money, Help Save Money

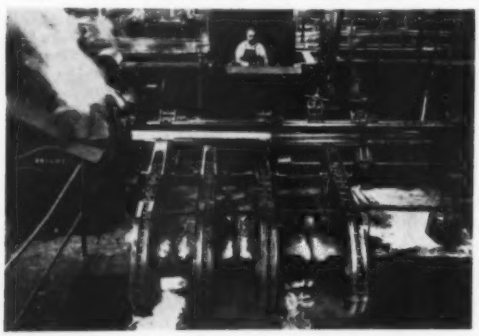
America's newly-printed "folding money" is assured safe passage through a 360 F. drying-out trip by coated Fiberglas conveyor tape. In its average daily output of $37,300,000 in greenbacks, the U. S. Bureau of Engraving & Printing reports that the tapes on which bills repose have outlasted and outperformed their cotton predecessors.

Former cotton tapes lasted an average of ten days, occasionally catching fire, causing the currency to ignite. Fiberglas tapes have now performed successfully in excess of five months, thereby insuring a steady output of greenbacks day in and day out. After printing, large currency sheets are placed in tape-conveyor machines to go through a sizing bath and drying oven.

In these machines the sheets of currency are coated with a protein sizing, the surface excess is squeezed off by rollers and the moist sheets are delivered to the tapes for conveying through the drying chamber. The tapes are subjected to temperatures ranging from 100 to 400 F., being alternately moist and dry in each cycle through the drier. In addition to their extreme durability, the tapes retain their high tensile strength and do not stretch or shrink.

Piercing Mill Gobbles Solid Billets, Spews Out Copper Tube in Seconds

Copper tube, produced from solid cast billets, gets its first rigorous processing in this piercing machine at Chase Brass & Copper Co. mill in Waterbury, Conn. Heated in a rotary furnace to approximately 1500 F., copper billets ranging in diameter from 3 to 9 in. and weighing up to 1000 lb, move into this billet piercer on a conveyor.



In the piercing machine the hot billets are rotated and driven ahead by tapered rollers, which open up the end of the billet to form a cavity. A mandrel then moves in and the copper continues to rotate over it until a rough, hollow tube is formed. A chain conveyor picks up the copper tube and passes through a water quench bath, then to a pile of cooling tubes.

From heated billet to quenched rough tube requires less than a minute. The operator shown controls the entire process with hand levers without even leaving his seat.

When a dozen or more pierced tubes have been stacked, an overhead crane carries them to one of the Chase drawbenches which cold draws the tube through dies down to the desired size for use in chemical plants, refrigeration, water lines, electric bus or a hundred other applications.

Aluminum Pipe Used for Distilled Water System

Industry, with good reason, is slow to discard the tried and true in favor of the new. So when products which for decades have been formed of steel, copper, wood, or whatever, appear in aluminum, it is certain that the special properties and advantages of the metal —lightness, workability, conductivity, etc.—have become known and accepted.

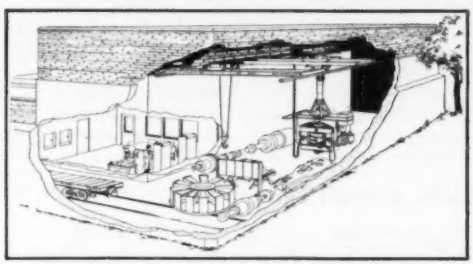
It is safe to say that as few as ten years ago most pipe fitters had never so much as handled a piece of aluminum pipe or equipment. But at a current job of James A. Nelson, San Francisco contractors, we find one workman carrying a dozen 12-ft lengths of ¾-in. aluminum pipe for a distilled water installation, to which aluminum pipe is ideally suited.

Magnetic Separators Remove Lids From Baker's Bread Pans

The Purity Baking Company, Charleston, W. Va., recently installed magnetic separators to remove lids from hot bread pans as they pass along an oven conveyor.

Picture shows the square cover of a pan lid being picked up by the magnets from the conveyor line. The latter carries the Pullman Pans from the front of the oven, where they are dumped, back to the bread dumping rack. Seen above the magnets is the compressed air mechanism used to kick the lids off the magnets into a return conveyor to the front of the oven. The magnetic separators are manufactured by the Eriez Manufacturing Company, Erie, Pa.

New Betatron Inspection Facilities for Turbines Near Completion



Construction is expected to be completed sometime in early 1952 on an 86 by 74-ft concrete building at the West Allis Works of Allis-Chalmers Manufacturing Co. to house a 22-million volt betatron for use in inspecting large steam turbine, centrifugal pump and hydraulic turbine parts produced by the firm.

The new building's steel reinforced concrete walls are 6 ft thick and 20 ft high to shield personnel from betatron radiation. The X-ray room is large enough to accommodate a railroad car. A Harnischfeger bridge crane capable of handling 25 tons will be used for lifting the specimens. The building also has a control room with operating panels and circuits, a darkroom with a dual set of stainless steel developing tanks, and a viewing room for inspection of radiographs.

The betatron will be mounted on a crane which will permit the beam to be rotated through 180 degrees about the horizontal axis and 360 degrees about the vertical axis of the focal spot.

Radioactive Cutting Tools Give Quick Test of Tool Life

Radioactive tracers, a product of the atomic energy program, are now being used to lengthen the life of machine tools, the American Society of Mechanical Engineers heard recently at its semi-annual meeting.

Present techniques in the application of this method were reported by E. J. Krabacher, research engineer; M. Eugene Merchant, assistant director of research, and Hans Ernst, director of research, all of the Cincinnati Milling Machine Co.

"The tool life (volume of metal removed per resharpening of the tool) obtained in production machining operations has long been recognized as a prime factor controlling production costs," it was reported in a jointly-prepared paper.

"The search for increased tool life through the development of improved cutting fluids, work materials and machining conditions, requires controlled laboratory tool life testing.

"The application of radio-isotopes to this testing appears to hold considerable promise for greatly speeding up and simplifying the normally expensive and slow process of obtaining such machinability data, making many more such measurements possible in a given time, at less cost and with much less material.

"The new method also offers a further prospect of advancing the science and practice of machining, in that it provides a means for exploring in the laboratory the basic mechanisms by which cutting tools wear and fail, thus furnishing fundamental information which, again, can be applied to improve the life of cutting tools in practice." (See "Atlantic Refining Points Way to Longer Engine Life," April issue, PLANT ENGINEERING, page 80.)

Coal Deliveries Made by 14,000 ft. Belt "Roller Coaster"

A rubber conveyor belt system that looks like a Coney Island roller coaster but stretches more than two and a half miles over, around and under rugged mountains is helping to make mountain-ringed Kanawha River Valley, near Charleston, W. Va., one of the nation's fastest-growing strategic industrial areas.

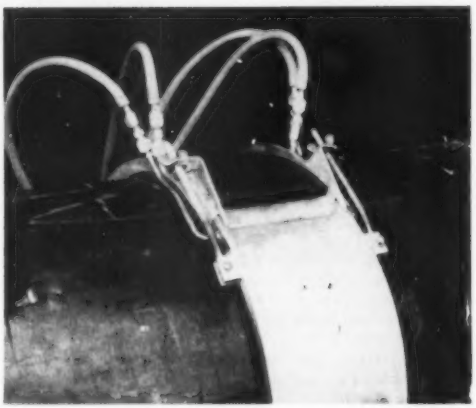
The conveyor, featuring a B. F. Goodrich rubber beltroad, transports coal from a mining area which is one of the sources of coal for a large steam generating plant now under construction on the banks of the Kanawha at Glasgow, W. Va.

The first flight of rubber belt, a 1200 ft section, picks up coal from a drift mine 500 ft up on the side of a mountain and carries it down the mountainside at a 17-deg angle for an over-all drop of 296 ft.

From here, the belt threads its way across country

for more than 4000 ft, then rises to cling to the steep side of a second mountain which it circles for 4700 ft in a series of roller coaster dips and rises. The rubber beltroad next burrows into a 4000 foot tunnel drilled through the base of a third mountain. The belt emerges finally at the Kanawha River, near Montgomery, W. Va., 14,000 ft from the start of its skyscraper ride.

New Inspection Technique Saves Many Hours on Big Welding Jobs



Technique of "hot radiography" permits the taking of X-ray photographs of large pipes, valves, and similar units at temperatures as high as 1200 F. This process, called the McElroy-McNutt hot radiography process, has been applied with considerable success to the inspection of partially completed welds on hot sections of pipe to check for possible welding defects.

Because hot radiography can be accomplished at elevated temperatures, the method eliminates several time-consuming steps necessary for the usual radiographic inspection techniques. Hot radiography, which can be accomplished on a hot pipe, makes it practical to interrupt the welding operation to inspect the weld root where most flaws occur. This technique, therefore, saves the many man-hours of heating and controlled cooling that were formerly required before the weld could be inspected. Additional time is saved because, if defects are found, it is necessary to chip away only a partially-completed weld, rather than a finished weld. Licensing rights are held by Sam Tour & Co., Inc.

Precision Watchmaker's Lathe Produces Delicate Aircraft Parts

A Levin lathe, as used by watchmakers, is playing a vital role in our country's air defense, according to engineers of the AiResearch Manufacturing Company of Los Angeles.

Lap-winding 4000 turns on a minute armature only 1 in. long and 3/16 in. in diameter, is one delicate task assigned to this highly precisioned lathe. The armature is the heart of a vibration pickup coil used in an instrument which balances dollar-sized air turbine wheels within five-millionths of an inch.

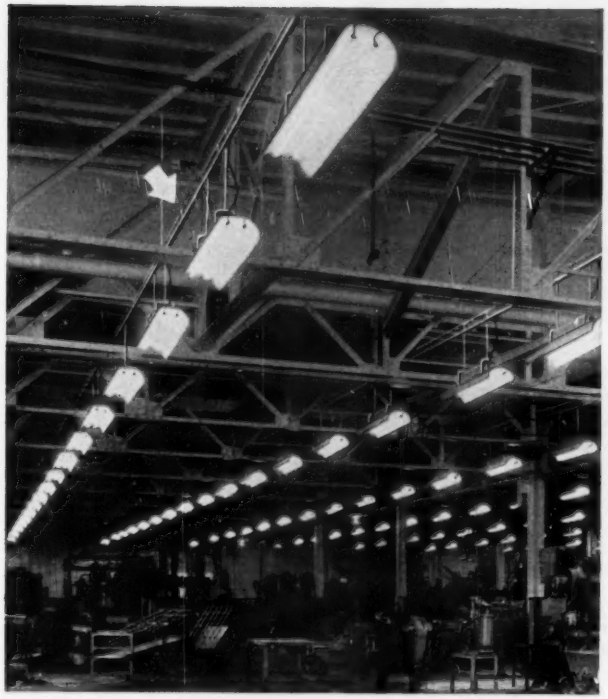
There is no such thing as perfect balance, but this company comes about as close as is physically possible when it tunes up its midget air turbine wheels to spin at 100,000 rpm.

Any appreciable wobble at that speed could set up vibrations which would wreck the delicate mechanism of an air turbine refrigeration unit—and jeopardize the life of the jet pilot depending on it in the stratosphere.

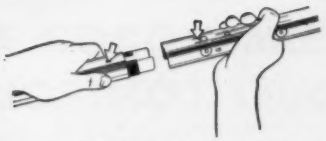
In order to insure that its equipment attains mechanical perfection, AiResearch has invested in one of the most completely equipped, privately owned laboratory and test facilities in the country.

Most of the test equipment employed by the instrumentation laboratory isn't available on the market, so it must be made in the lab. The lathe is exceptionally well suited for this work even when meeting tolerances fifty times closer than those required in the finest watch . . . the ideal equipment needed to turn out a precision machine with one ten-thousandths of an in. tolerances.

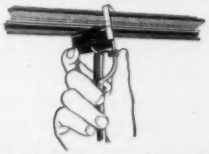
Lighting where and when you need it ... without rewiring!



Safe. Sturdy. Current-carrying Trol-E-Duct bus bars are totally enclosed. Duct itself (arrow) supports fixtures. Continuous slot in bottom of duct means you can move lights (or small portable tools on trolleys) anywhere, any time without rewiring. *It's every inch an outlet!*



Quickly installed. Sections go up in a hurry, join without bolting. Sections are prefabricated, standardized in lengths of from 1 to 10 feet. Entire duct can be dismantled and reinstalled easily without a scrapped part.



Convenient. Lighting twist-out plugs slip into duct without cutting off power or upsetting production schedules. Plugs ground on steel casing before contacts touch bus bars, slide in with simple twist anywhere along duct.

Mobile Trolleys. Smooth-rolling trolleys are available to carry small, portable power tools, speed up production. Trolleys ride inside duct on metal wheels. Constant spring pressure against bus bars assures perfect contact.

BullDog Universal Trol-E-Duct lets you add, remove or rearrange lights quickly. No loss of man-hours, money, material.

When it comes to moving lighting fixtures, costs usually skyrocket. Not so with BullDog Universal Trol-E-Duct.

For here is a *truly mobile, fully flexible* lighting system at its money-saving best.

Every inch of Trol-E-Duct is a potential tap-off for lights or small power tools. To move lights or add new ones when you change machine layout, just slip twist-out plugs or trolleys in or out of continuous slot in bottom of duct. Duct itself supports lighting fixtures.

That's all. No rewiring needed. No production lost through shutdowns. No wasted man-hours or scrapped material, either, as with fixed outlet systems.

Trol-E-Duct is prefabricated, standardized and salvable. Installs in a hurry. Can be dismantled and reinstalled without loss.

Get all the facts on this modern, low-cost lighting system that fits present needs . . . provides for future needs, as well. Contact a nearby BullDog Field Engineer. He'll show you an installation in your area that will speak for itself. Or, for descriptive bulletin, write BullDog direct, won't you?

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO
PIONEERS IN FLEXIBLE ELECTRICAL DISTRIBUTION SYSTEMS

BULLDOG

SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

GET THE SYSTEM THAT OFFERS TOP EFFICIENCY FOR FUME, ODOR AND DUST CONTROL . . .

MULTI-WASH

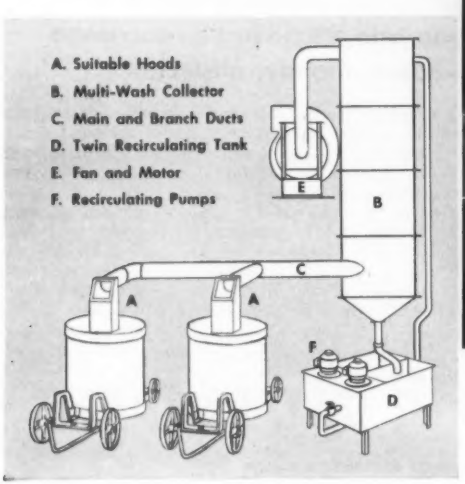
There's no need to tolerate the nuisance of paint, varnish or lacquer fumes, odors and dusts. Years of *on-the-job* operation under all kinds of conditions, have proven that the Schneible Multi-Wash System is the *most efficient method* of controlling this common nuisance. Special tests performed for the industry also bears out this statement.

Not only does the Multi-Wash give top efficiency in removing toxic air so harmful to the employees' health, but it recovers valuable volatile oils and solvents for reprocessing or reuse, thus saving its cost many times over.

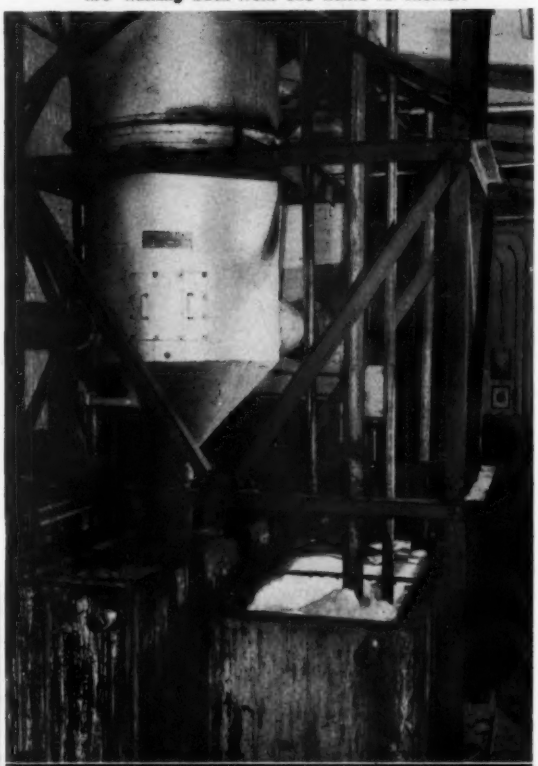
Whether you want to clean up the fumes from varnish kettles or collect the dust from pigment processing and mixing operations, you'll find that Schneible engineers have the answer.

Write for bulletin No. 551 covering information relative to paint, varnish, lacquer and printing ink applications.

CLAUDE B. SCHNEIBLE COMPANY
P. O. BOX 81, NORTH END STATION
DETROIT 2, MICHIGAN



Pair of Multi-Wash Collectors handling 6 cooking kettles. Note that there is a separate inlet from each kettle hood to Collector to eliminate fire flashing back from one kettle to another.



SCHNEIBLE
MANUFACTURERS • ENGINEERS • CONTRACTORS

PRODUCTS:
Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

You can't stop a bullet with a catcher's mitt

You can't stop corrosion with ordinary paints...

it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time.

But Bitumastic Coatings can!

BECAUSE the six Bitumastic® Protective Coatings, unlike maintenance paints, are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. And when you keep moisture away from an exposed surface, you *stop* corrosion.

BECAUSE Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable.

BECAUSE Bitumastic Coatings provide up to 8 times the film thickness of conventional paint coatings.

BECAUSE Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—corrosive soil—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information.

**Hi-Heat Gray contains heat-resistant metallic base.*

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc.
Tar Products Division
Dept. 723-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, your booklets on corrosion prevention.

Name.....

Address.....

City.....Zone.....State.....

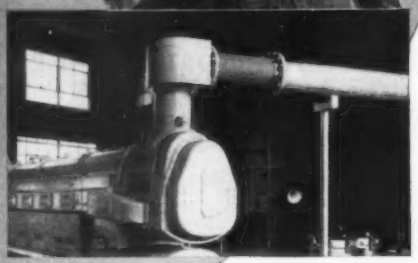
KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 723-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

Large Diameter CMH REX-WELD CORRUGATED FLEXIBLE METAL HOSE

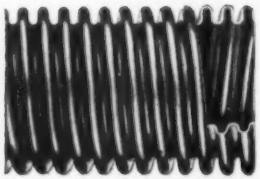


the answer to motion control for:

Diesel Engine Air Intake and Exhaust Lines • Tank Settling Connections • Safety Valve Vent Piping • Compressor Vibration Connections • Heavy Duty Loading and Unloading • And Many Other Services

Wherever large diameter connections must have the flexibility to absorb vibration or expansion and contraction, correct for misalignment or allow movement, and yet provide the rugged durability of metal, CMH REX-WELD Type RW-75 is the answer. REX-WELD Type RW-75 is the flexible connection that requires no packing, no periodical maintenance. All metal construction is completely gas and liquid tight.

For full information and data sheets see your local CMH distributor—look for his name in your classified telephone directory—or write direct.



CMH REX-WELD Type RW-75 is helically corrugated flexible steel hose and is made in sizes from 5" to 24" I.D., inclusive. Furnished with standard pipe nipples, couplings, fixed or floating flanges. Flanges to customers design can also be attached. Where required RW-75 can be supplied with metal braid covering.

CHICAGO METAL HOSE Division

Flexonics Corporation

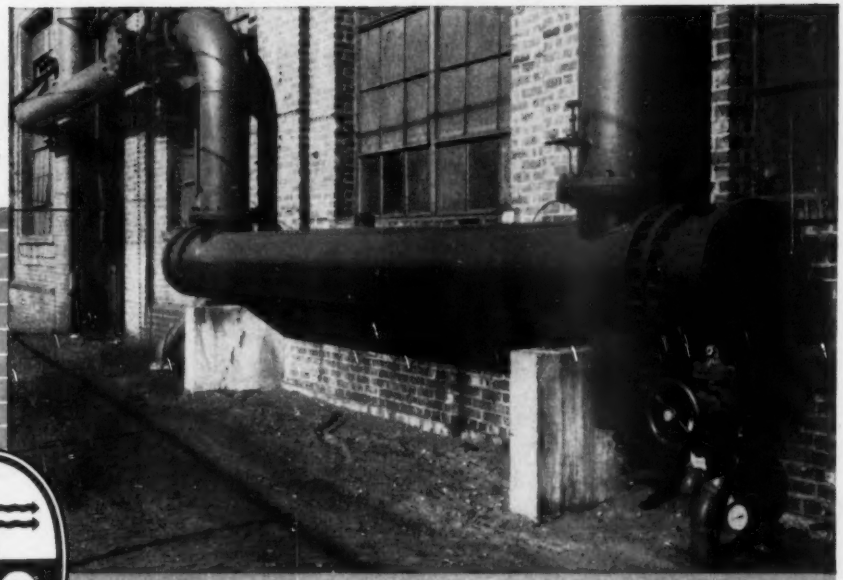
1340 S. Third Avenue • Maywood, Illinois

Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems • Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexon identifies CMH products that have served industry for over 50 years.

CMH



Installation of B & G Gas Cooler

Hydro-Flo HEAT EXCHANGERS

invite your critical appraisal of design and workmanship

Whether you require equipment of standard design or specially engineered units, B & G *Hydro-Flo* Heat Exchangers will stand up under any measurement of value you can apply. They are the sum of both practical field experience and continuous laboratory research and development.

The sound design of B & G *Hydro-Flo* Heat Exchangers is translated by modern manufacturing methods into units of proved efficiency . . . built to do the job well over a long operating life. The line is comprehensive—covering the numerous applications of heat exchangers in modern industrial plants.

The B & G engineering staff is always available for consultation on your heat transfer problems.

B&G Hydro-Flo shell-and-tube heat exchangers are available in the following types:

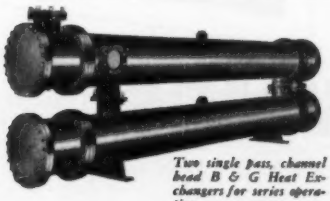
Straight and "U" Bend Tube Heat Exchangers . . . Fuel Oil Preheaters . . . Tank Suction Heaters . . . Aftercoolers . . . Gas coolers . . . Water Heaters . . . Refrigeration Evaporators and Condensers . . . Quench Oil Coolers.

BELL & GOSSETT

COMPANY

Dept. CO-53, Morton Grove, Ill.

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto, Canada



Two single pass, channel head B & G Heat Exchangers for series operation.

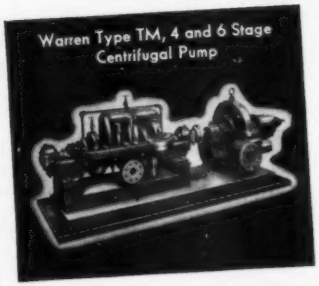
High pressure B&G Heater with fixed tube sheets and expansion joint design.

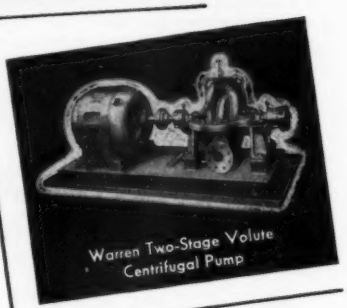
B & G CENTRIFUGAL PUMPS
A complete line for industrial application and refrigeration or air conditioning installations. Send for catalogs.

a boiler plant is no more dependable than its Feed pumps....

For well over half a century Warren has specialized in this field and has kept pace with boiler feed requirements as they have developed over the years.

As builders of both Centrifugal and Reciprocating types and for light, medium and higher pressure services, there is a thoroughly dependable Warren Pump to meet a very large part of all boiler feed conditions.
Their on-the-job record has long been one of reliable, low cost operation.





P-28

Time-Tested Experience Indicates it is Good Business

to Specify **WARREN PUMPS**

WARREN QUIMBY PUMPS

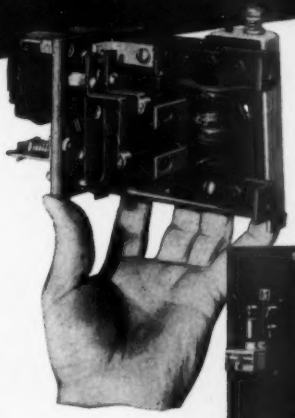
WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS

Centrifugal . . . . . Reciprocating . . . . . Rotary

NON-STOP OPERATION SAFEGUARDED

by EC&M THERMAL-MAGNETIC OVERLOAD RELAYS

set at 90% to 110% full load current



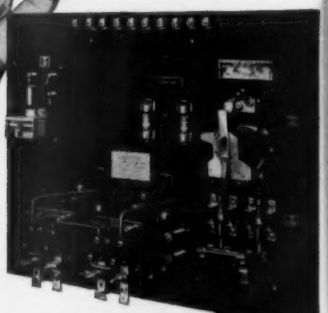
¾ rear view shows independent thermal and magnetic tripping elements — both are adjustable. Relay is front-connected, removable as a unit from the mounting-base.

In a certain chemical processing cycle motor-drives operate up to six months without stopping. Continuous operation is essential until the product is completely processed and the machines cleared. Ambient temperatures are high.

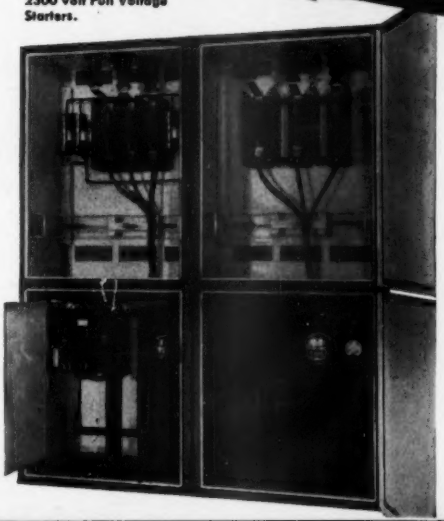
To safeguard the insulation of these motors—by keeping temperature rise within safe limits—EC&M 2300 volt Motor Starters with EC&M NEW Type ZTM THERMAL-MAGNETIC Overload Relays were chosen.

These new Relays couple motor current directly to thermal action through a transformer for quick, positive response. Depending upon the motor load and ambient temperature, the thermal element of these Relays is adjusted from 90 to 110% Full Load Motor Current. Thermal reset time is short. Magnetic instantaneous operation minimizes damage under fault current conditions.

For improved motor protection, investigate EC&M THERMAL-MAGNETIC Overload Relays.



Type ZTM Overload Relay Panel with Time-Delay Under Voltage Protection feature is mounted in the lower compartment of EC&M 2300 volt Full Voltage Starters.

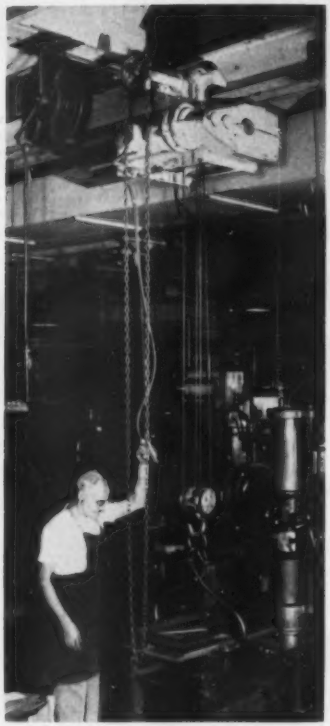


Write for your copy of Bulletin 1180-327

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

another
"REPAID IN FULL"
R&M installation



Just one of the many Robbins & Myers hoists in use at Advance Die & Tool Co., Cleveland, Ohio is pictured here loading a die onto the table of a radial drill. Advance uses hoists ranging from 2 to 10 tons in capacity to transport stock, components, and sets into, through, and out of, their plant. R & M hoists load die sets into presses for checking, help in assembly — in fact do all the heavy lifting and stevedoring essential in metal working plants. Management tells us that regardless of cost (which is surprisingly low) their hoists have speeded loading and handling throughout their plant and materially reduced productive time lost by manual handling. Needless to say this is another "repaid in full" R & M installation. For real help on efficient materials handling write for Bulletin No. P72E.

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

NEW PRODUCTS

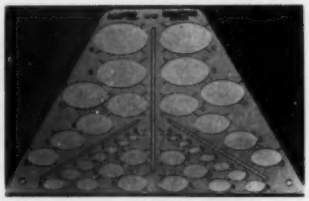
(Begins on page 110)

type; three speeds forward and reverse.

Designed for multi-purpose service, indoors or outdoors, this sweeper incorporates company's Duscon system which requires no sprinkling or other treatment to lay the dust. It draws dust-laden air from the top of the hopper, discharging this air through a cyclone-type spinner which separates the dust from the debris. Bulletin S-102 describes the Model 1000-S in detail. Wilshire Power Sweeper Co.

18—ISOMETRIC TEMPLATE has unusual slot arrangement

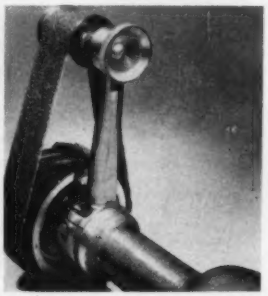
All three axes can be drawn without turning the No. 123 Isometric Template; this template has to be turned



only when ellipses in different elevation are needed. Contains 38 ellipses from ⅛ to 1-9/16 in. Made of plastic, the No. 123 sells for $3.00. RapiDesign, Inc.

19—ATTACHMENT for grinding with portable tools

A new concept of portable grinding is credited to the 61 Portabelt Grinding Attachment which permits use of abrasive belts on straight spindle air and electric portable tools. Announced jointly by the Carborundum Co. and Buckeye Tool Corp., the attachment is made of light weight aluminum castings and consists of an idler puller,

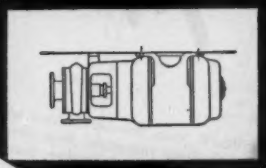


the supporting mechanisms, and a contact wheel. The wheel is mounted on the tool spindle. The unit is attached by a split bracket to the casing of the tool where grinding wheel guards are normally mounted. This bracket makes the unit adaptable to almost any portable tool of the proper speed and type.

Applications are to be found in many

SQUEEZED FOR SPACE?

Fits anywhere —any way



Upside down

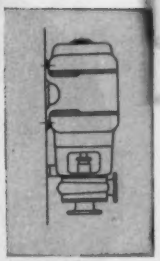
On an angle

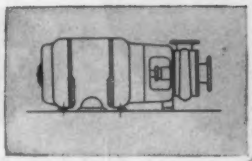
If plant expansion pains have you squeezed for floor space, Fairbanks-Morse *Builtogether* Centrifugal Pumps can help solve your problems.

These compact, efficient pumps can be mounted horizontally, vertically, or on an angle . . . on the floor or from the ceiling. Backed by the Fairbanks-Morse reputation for quality, these pumps will always deliver outstandingly dependable performance. An important extra advantage to you is the fact that both motor and pump are built by Fairbanks-Morse . . . your assurance of efficient service.

Fairbanks-Morse Builtogether Pumps are available in both single and two-stage models . . . in capacities up to 1000 gallons per minute against heads up to 550 feet. For complete information, see your local Fairbanks-Morse Branch, or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

Vertically





Horizontally

Angled upside down

FAIRBANKS-MORSE,

a name worth remembering

PUMPS • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • SCALES
HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

Corrective Maintenance

You'll stop trouble before trouble starts with these industrial *fluid drives*. For they *eliminate—entirely*—many, many causes for periodic maintenance, repair or breakdowns.

These Twin Disc Fluid Drives, for example, help you:

1. Avoid Starting Stalls: Motor or engine quickly reaches efficient operating speed under light load . . . then picks up full load smoothly and with rapid acceleration.

2. Cushion Shock-Impact Loads: The hydraulic cushion protects both driving and driven units against failure due to shock-impact loads.

3. Avoid Overload Breakage: Stops to fix shear pins are eliminated. You don't need such "break-and-replace" devices.

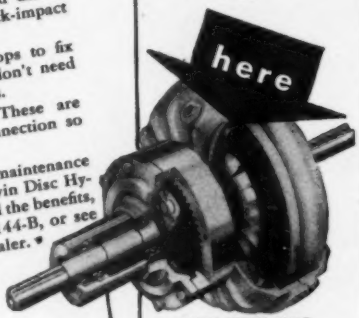
4. Avoid Torsional Vibrations: These are dampened out by the fluid connection so that power applied is smooth!

These are only four *corrective* maintenance advantages you secure with Twin Disc Hydraulic Coupling Drives. For all the benefits, write today for Bulletin No. 144-B, or see your Twin Disc Hydraulic Dealer.*

starts here

HYDRO-SHEAVE* DRIVE
¾ hp to 40 hp
Complete package, slides right on shaft

here



HYDRO-WYND* DRIVE
7.4" and 8.4" Sizes
Winds with constant tension—constant speed

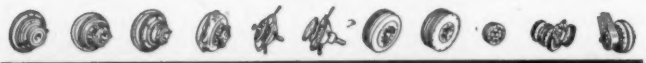
and here

DOUBLE-CIRCUIT HYDRAULIC COUPLING
Fractional hp to 700 hp—Wide choice of mountings and housings

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

*Registered Trade Mark

Clutches & Hydraulic Drives



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

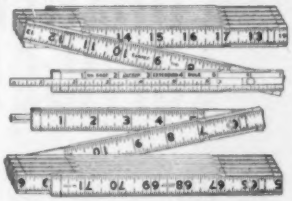
NEW PRODUCTS

(Begins on page 110)

areas where mounted grinding equipment is now used. Use of the belt grinding attachment means more abrasive surface available, and utilization of the entire surface. Its use is also said to afford reduced operating costs and permit reaching areas previously inaccessible. The Carborundum Co.

20—EXTENSION RULE for inside, outside measuring

The X-46F is the newest of manufacturer's well known Red End Rules. Due to its modern design, this one



rule is all that's needed for inside, outside, regular and flat reading measurements. Numbering begins at the extension end of the rule, both sides, for flat reading or regular measurements; in flat measuring the measurement lies close to the work, even when the rule is partly open. The brass extension slide allows inside measurements to 78 in.

The X-46F is made of hardwood, has a boxwood finish protected by a tough, clear plastic coat, and has brass strike plates. Both edges of both sides of the rule are graduated; folded length is 8 in. Lufkin Rule Co.

21—SYNCLINAL FILTERS for use in water filtration

Widely used for low pressure oil recirculating systems the synclinal filters manufactured by this company are now adapted for water filtration. The sump type comes in capacities from 5 to 100 gpm and the line type from 5 to 50 gpm. Monel mesh screens range from coarse 30 to fine 200. Line types operate in any position and may be serviced without disturbing pipe connections. Both types may be cleaned on the spot. Engineering data on filters available. Marvel Engineering Co.

22—WINDOW WASHER with water supply and wick

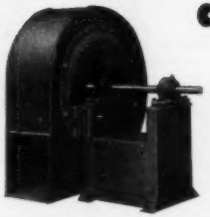
This aluminum window washer has its own washing wick and wipe-dry squeegee, and holds water enough for cleaning 40 windows. Water is fed to the rough-textured felt wick through a control valve. Company says the washer cleans the dirtiest of windows, removes even bug stains. Its hollow handle fits over a mop or broom handle for use on high windows. The unit is to retail for $3.95. Haldane-Blake, Inc.

HEADQUARTERS FOR AIR HANDLING AND CONDITIONING EQUIPMENT

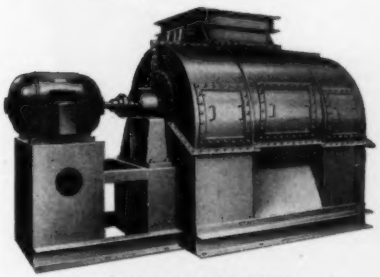
. . . . to meet all types of industrial, power plant, commercial and public building requirements.

CLARAGE

The Sign of Resourceful Engineering and Economical Performance



INDUSTRIAL FANS—for blowing or exhausting. Large range of capacity sizes—suitable for many applications.



MECHANICAL DRAFT FANS—both forced and induced draft. Heavy-duty construction for continuous operation at peak loads.

CAST IRON FANS—for industrial services. Unique construction assures extra long life when handling corrosive gases.

What you're looking for in air handling and air conditioning you are likely to find at Clarage Fan . . . highly efficient, dependable equipment — job engineered to your particular needs . . .

It's nearly 40 years since we started building fans, blowers and allied products. We have had ample time to temper research with experience, engineering with sound practice, manufacturing to actual operating in-the-field demands . . . .

You can profit by dealing with Clarage. We have an established reputation for getting things done right . . . . As evidence of what we mean, 97 of the 100 largest American corporations are users of Clarage fan equipment. Need we say more?

CLARAGE FAN COMPANY

611 PORTER ST., KALAMAZOO, MICH.

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: **4285 Richelieu St., Montreal Canada Fans, Ltd.**

You Can Rely on Clarage

America's Flagship . . .

The S. S. UNITED STATES

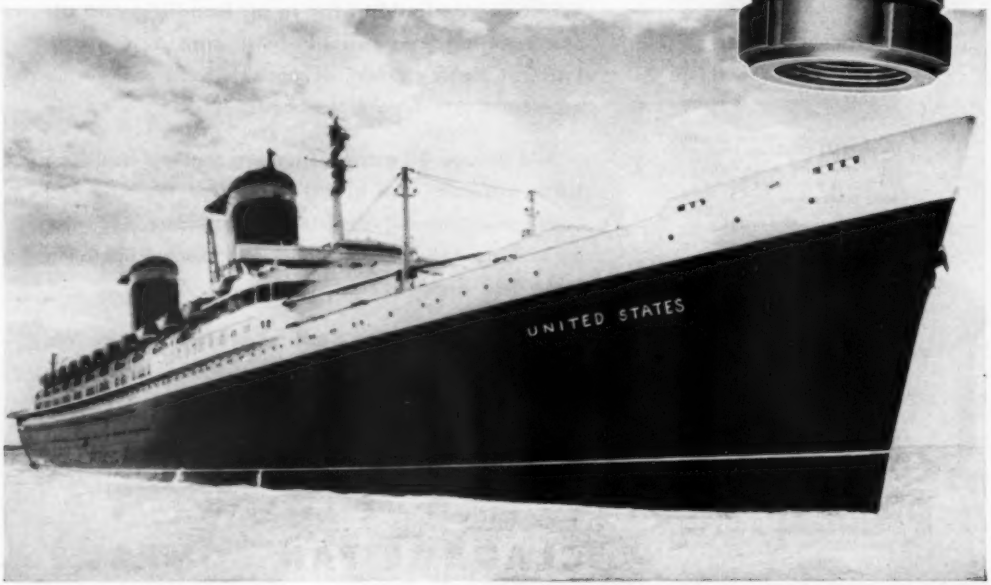
. . . a $70,000,000 investment protected by REPUBLIC FIRE HOSE

This luxuriously appointed goliath is the largest steamship ever built in our country. It is also one of the world's largest structures of any kind—afloat or ashore!

Designed by the famous naval architects, Gibbs & Cox, Inc., and built by the country's foremost shipbuilders, Newport News Shipbuilding and Dry Dock Company, the S.S. United States will soon be ready to challenge all comers for speed, comfort and safety of travel across the North Atlantic.

Republic Rubber is proud to have served the builders of this great ship. The thousands of feet of Republic Fire Hose selected for duty aboard this vessel will provide the highest degree of safety for passengers, crew and cargo.

We hope the hose never sees action. But should necessity arise you can bet it'll turn in an outstanding performance—typical of all Republic Industrial Rubber Products!



INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION
Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO

• The supership United States is built to carry 2,000 passengers, a 1,000-man crew and to convert, if necessary, into a transport for 14,000 troops. Secret features of design enable the 4½-block long leviathan to steam 10,000 miles without refueling. The Republic Fire Hose used on this installation is built with long-lasting rubber tube surrounded by a double jacket of flawless cotton fabric.

Maintenance Blast Cleaning

(Continued from page 73)

by the type of work to be cleaned.

Electrical equipment — motors, generators, armatures, delicate controls and other work of this nature are best cleaned with pressures ranging from 7 to 40 lb. Mechanical equipment such as lathes, drill presses, overhead cranes, lift trucks, gasoline engines, etc., are best cleaned with pressures ranging from 40 lb to 90 lbs.

This machine was designed especially to use these two light and fluffy materials and to accommodate their physical peculiarities — they have no angular repose and will bridge (they will not collapse when tunneled through). On the positive side, these materials cause practically no wear to the machine. However, because of the air differential in the machine during blasting, use of silica sand or metallic abrasive in this machine will rapidly erode away the live rubber valve in the mixing chamber. Therefore, their use in this machine is not recommended.

One of the first complete installations of the new soft-grit cleaning equipment was made at the Riverdale plant of Acme Steel Company, Chicago. This installation includes: the portable soft-grit blasting machine; a special soft-grit blast room 12 ft long by 10 ft deep by 7½ ft high, and a standard dust collector mounted on top, see Fig. 1.

This blast-cleaning room has no door in the usual sense. It has two small doors that permit a 12½-ft opening when loading or unloading large pieces and a 6-ft opening during blast-cleaning operations. This latter opening permits the entry of 3600 ft of air per minute.

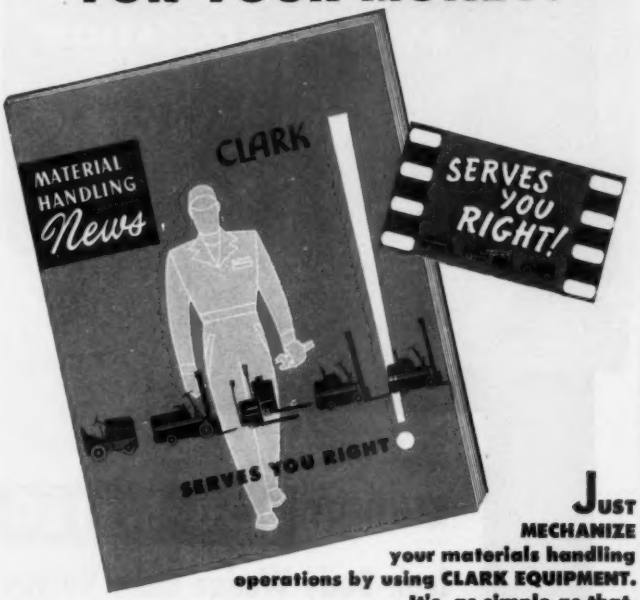
The room is equipped with a suction sweep which disposes of used abrasives after blasing. The dust collector unit is cleaned out by dumping into trucks which are brought right into the blast room. The soft grit abrasive is not used over again.

Acme Steel's policy is to take all equipment that can be moved (and which is not too large for the size of the room) to this room for cleaning. Equipment that cannot be moved is cleaned in place by use of the portable blast-cleaning unit.

This company is currently cleaning armatures, gears, gas engines, trucks and other plant equipment in this booth. The company's power trucks are cleaned with the same portable blast cleaning unit, using hardwood sawdust as the abrasive. Company officials anticipate that this installation will substantially reduce cleaning costs on mechanical and electrical equipment.

The Gary Sheet and Tin Mills of the United States Steel Company, Gary, Indiana, uses corn cob grits in this equipment on many of its

HOW TO GET THE MOST FOR YOUR MONEY!



JUST MECHANIZE your materials handling operations by using CLARK EQUIPMENT. It's as simple as that.

● That's what they all say? Perhaps. But CLARK backs up *its* claim with facts and unmatched performance.

On the questions of . . .
√ Quality, Longevity
√ Savings Achieved
√ Customer Satisfaction
√ Number of Trucks In Use
√ Efficiency and Performance
√ Economy of Operation and Maintenance
√ Factory and On-The-Ground Service

. . . there is at hand—and available to you—overwhelming evidence that CLARK Serves You Right!

The whys and wherefores are available to you in two new media—the "SERVES YOU RIGHT" edition of our Material Handling News, and our new movie on the use of fork-lift trucks and industrial towing tractors in Plant Maintenance Work.

Each of these items is free to you—the 15-minute sound movie, black-and-white, on a loan basis. They'll tell you and show you how CLARK enables you to get the *MOST* for your money. Just fill out the coupon, attach to your business letterhead and place in your "outgoing" mail basket.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS · INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 98, MICHIGAN
Please send: ☐ Material Handling News • ☐ Movie "Serves You Right"
☐ Have Representative Call.

Name_____
Firm Name_____
Address_____
City_____ Zone____ State_____

SPECIALLY DESIGNED
for
EASIER INSTALLATION
and
LONGER SERVICE

Fig. 0611, 1BBM Wedge Gate Valve, Working Pressures: 125 lbs. Steam, 200 lbs. WOG.

KENNEDY JOB-FITTED
Iron-Body Wedge Gate Valves

YOU SAVE TIME AND MONEY all along the line with Kennedy iron-body wedge gate valves because they are JOB-FITTED . . . every valve specially designed and engineered for the job it has to do.

THE WEDGE DISC is a cored casting of thick metal section, reinforced by integrally-cast interior posts and provided with openings to drain in any position.

HEAVY BRONZE DISC RINGS are forced into dovetailed grooves in the disc in a practically inseparable construction.

HIGHER STRENGTH IRON in the body and bonnet is actually 50% stronger than ordinary cast iron . . . and far exceeds A.S.T.M. requirements.

ALL CONTACT SURFACES between moving parts are bronze-to-bronze to assure easy operation.

RUSTPROOFED STEEL BOLTS AND NUTS have ample clearance to prevent distortion. Open-end wrenches may be used . . . no need for special tools. Valves can be repacked under full pressure.

EVERY FEATURE of the valve helps it do the job better . . . gives you a solid guarantee of economy and dependability whenever you install one of these Kennedy Job-Fitted Wedge Gate Valves.

BUY FROM YOUR LOCAL DISTRIBUTOR

WRITE FOR BULLETIN 107

THE KENNEDY
VALVE MFG. CO. • ELMIRA, N.Y.
Est. 1877
VALVES • PIPE FITTINGS • FIRE HYDRANTS

electrical and mechanical cleaning operations. One of the electrical units cleaned with corn cob grits in this plant is the 8400-hp motor shown in Fig. 2. Smaller motors such as the 15-hp motor shown in Fig. 3 was also cleaned here by this method.

Experiments on the effectiveness of various soft grits for cleaning all types of industrial parts were conducted by: the Agricultural Research Administration's North Regional Laboratory in Peoria, Illinois; the U. S. Air Force; U. S. Steel Company's Gary Sheet and Tin Mills; and Pangborn Corporation of Hagerstown, Maryland—manufacturers of blast cleaning and dust control equipment.

Industrial Odors

(Continued from page 78)

fensive odors. To accomplish this, all of the exhausted gases must be heated to a temperature of at least 1400 F before they are released. This can be done by sending them through an oil or gas fired incinerator or through the firebox of a boiler.

The company has been experimenting with many of these methods and finally decided to use incineration to eliminate the problem. We had no firebox to use, so in order to reduce the cost of operation of a separate incinerator, we devised a system of recirculation. With it only small amounts of air carrying offensive odors are incinerated.

Primary air is introduced into the firebox to supply sufficient oxygen to keep the oil burner operating. The rest of the air is recirculated from the scrubber tower. This mixture of hot air is drawn through the rotary dryer by the blower on the outlet end of the dryer. This blower pushes it through the dust collector and then into the scrubber tower where a large volume of cold water condenses the steam and vapor. The cool air leaves the scrubber at the bottom. Part is carried to the incinerator and part is sent through the heat exchanger for recirculation to the dryer.

In this system the scrubber tower serves two purposes. It is necessary to remove the moisture from the part of the air which is recirculated so that it can carry more moisture out of the dryer. It is also economical to remove the moisture from the part of the air which goes through the incinerator. This saves the heat required to raise the temperature of the water vapor to incineration temperature.

In the scrubber tower we use 600 gpm of sea water and this is allowed to drain back into the sea. The condensed water vapor from the dryer and the dissolved gases do not make this water offensive since they are diluted to such a high degree.

We have found this incineration method to be most effective. We are located in the heart of a small city and since this system has been in operation, we have not had complaints of creating an odor nuisance.

Steel stored in this DRY stock room needs no protective grease coating.

This Lectrodryer DRYs the air.

The Kenilworth Steel Company surrounds finished products with DRY air to speed shipments

Tempered spring steel, feeler gauge and shim steel can be shipped without the usual time-consuming degreasing operation by The Kenilworth Steel Company, Kenilworth, New Jersey. That's because it goes into DRY storage without being doped with grease. Think what that means in time and money saved!

No moisture in the air, no condensation to cause rusting; the Lectrodryer* provides that solution to a problem encountered in most storage areas.

If you're bothered with unwanted moisture in your warehouses and workrooms—in air under pressure, gases or organic liquids—Lectrodryer engineers will show you how to get rid of it. They'll help you prepare the areas for DRY storage and recommend the equipment you'll need.

Bulletin 216 tells how others have profited by consulting Pittsburgh Lectrodryer Corporation, 333 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sydney.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
In Belgium: S. A. Belge Stein et Roubaix, 320 Rue du Moulin, Bressoux-Liege.

LECTRODRYERS DRY
WITH ACTIVATED ALUMINAS

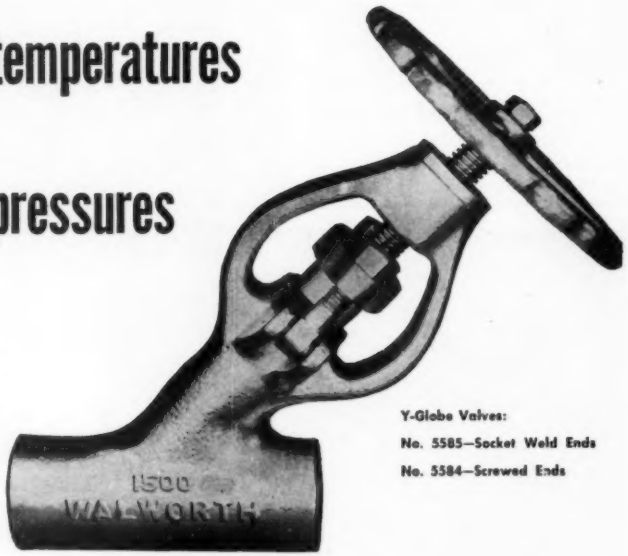
LECTRODRYER

* REGISTERED TRADEMARK U.S. PAT. OFF.

Walworth's NEW small cast steel valves

SERIES 1500 – SIZES ¼ to 2 inches

handle { HIGH temperatures / HIGH pressures



Y-Globe Valves:
No. 5585—Socket Weld Ends
No. 5584—Screwed Ends

Walworth is proud to make these new Small Cast Steel Valves available to power stations . . . oil refineries . . . ships . . . wherever piping is subject to severe pressures and temperatures. Non-shock service ratings of these valves: 1500 psi–950F for steam; 3600 psi–100F for water, oil or gas. Cast of chromium molybdenum steel, they are compact and light, yet exceptionally strong. Both Y-Globe and Angle type valves are available.

Angle Valves:
No. 5587—Socket Weld End
No. 5586—Screwed End

Simplified Walworth design eliminates many of the valve problems encountered in high pressure service. Among the features of this new valve are:

INTEGRAL BODY AND YOKE – made from a single casting without threading or welding. Bonnet joint — always a potential source of leakage — is eliminated. Valves can be reassembled quickly and easily.

ROTATING DISC – prevents valve seat distortion and consequent leakage. Cuts down replacements.

WELDED SEAT RING – compensates for changes in pressure and temperature—eliminates a major source of leakage.

SPECIAL BACK SEAT BUSHING – permits repacking the valve under pressure with greater safety.

PACKING CHAMBER – designed to dissipate heat thus keeping packing rings at lower temperatures—gives them longer life.

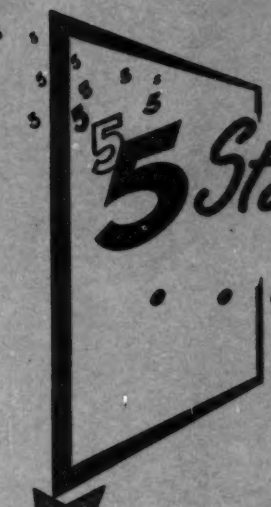
These valves are available with either socket weld ends or screwed ends, in sizes ranging from ¼ to 2 inches. For further information on Walworth series 1500 Small Cast Steel Valves, see your local Walworth distributor, or write for Circular No. 134.

WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



5 Star Reader Service . . . Plant Engineering keeps you posted!

The two cards below need no postage.
There's another card on pages 35-36.

BULLETINS

BEGINS ON PAGE 35
Describes new, free commercial literature. Use post card to list item numbers of bulletins.

DATA FILE

BEGINS ON PAGE 143
Reviews manufacturers' free general catalogs. Use card to list item numbers of those wanted.

NEW PRODUCTS

BEGINS ON PAGE 110
Tells what's new in equipment. Use post card to ask for more information on products.

ADVERTISERS' INDEX

SEE PAGE 172
Helps you find advertised products quickly. Use post card to ask for free literature offered.

PERSONALIZED SERVICE

Use post card to ask for data on an article . . . tear sheets . . . name of a manufacturer . . . or help with a problem.

Sec. 34.9 P. L. & R.
FIRST CLASS
CHICAGO, ILL.
PERMIT No. 353

BUSINESS REPLY CARD
No Postage Stamp Necessary If Mailed in the United States

POSTAGE WILL BE PAID BY—

PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

JULY, 1952
Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

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.....

Please Print or Typewrite

Your Name .....

Your Title .....

Your Company Name .....

Company Address .....

City ..... State .....

(If you prefer delivery at your home also fill below)

Home Address .....

City ..... State .....

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Also, use this card for more information on advertised products.

5 Star Reader Service . . . Plant Engineering keeps you posted!

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Use post card to ask for data on an article . . . tear sheets . . . name of a manufacturer . . . or help with a problem.

DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. Following catalog descriptions are handy page references to advertisements giving information on related subjects.

VALVES, TRAPS, PIPING AND ACCESSORIES

201 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co.
See ad on page 7 for information on steel valve design features.

202 Reducing Valve Engineering Data—Bulletin 962 explains how the contour of a pressure reducing valve contributes to efficiency of performance. Discusses straight-line flow, tight closing. A. W. Cash Co.
See ad on page 10 for information on other reducing valves.

203 Efficient Flow Control — Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, common troubles as well as mysterious Shows how valves are designed for service, low maintenance. The Wm. Powell Co.
See ad on page 33.

204 Automatic Valves — Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.
See ad on page 164 for information on pressure regulators.

205 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.
See ad on page 151 for information on connections for refrigeration compressors.

206 Pressure-Vacuum Vent Valves — Bulletin E-601, 24 pp, is devoted to combination pressure-vacuum vent valves, stressing their low upkeep costs, positive shut-off, automatic operation and other features. Two types are presented — a standard assembly, and one with flame arrester element especially suited for use on storage tanks containing flammable materials. Black, Sivalls & Bryson, Inc.
See ad on page 59 for information on diaphragm control valves.

207 Solder Joint Valve — Bulletin 103 describes a 100-lb valve for use with copper tubing. Gives working pressures, temperatures. Tells how to install a solder joint valve. The Kennedy Valve Mfg. Co.
See ad on page 138 for information on iron body wedge gate valves.

208 Small Steel Valves—Illustrated Circular 134 describes a line of small cast steel valves for high pressure service. Tells how valves are built, where to use them. Gives dimensions, weights, prices on both globe and angle types. Walworth Co.
See ad on page 140.

209 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.
See ad on page 111 for information on pressure seal gate valve.

211 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.
See ad on page 171 for information on pilot-operated temperature regulator.

212 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.
See ad on page 25.

213 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.
See ad on page 68.

214 How to Install, Maintain Traps — Form 1722 is an 8-pp illustrated instruction folder covering use of company's traps. Installation section covers location of traps, hookups, bypasses, use of strainers, other factors to be considered. A chapter on trouble shooting includes discussion of trap troubles. Armstrong Machine Works.
See ad on page 5.

215 Steel Unions — This catalog sheet describes and pictures several types of steel unions, telling applications of each and listing sizes, prices. Features an orifice union for flow control of steam, oil, ammonia, chemicals, water, gas, also metering applications. Clayton Mark & Co.
See ad on page 54.

216 To Stop Those Leaks—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. M. B. Skinner Co.
See ad on page 160.

217 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co.
See ad on page 61 for information on new technical literature available.

218 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.
See ad on page 109 for information on adjustable pipe hangers.

219 Flexible Hose, Bellows — Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is included, covering bellows used in many types of control, regulators and thermostatic devices. A selection guide is provided for steam traps, valves. Flexonics Corp. (formerly Chicago Metal Hose Corp.).
See ad on page 128.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

221 The Cost of Excess Moisture — Thirty-pp Bulletin 216 explains that while high humidity doesn't show it can spoil many products in process and storage. Tells how typical plants have solved the excess moisture problem by electric dehumidifiers. Pittsburgh Lectrodryer Corp.
See ad on page 139.

222 Controlled Ventilation — Bulletin DV-31-51 contains illustrations, construction details, capacity ratings and dimensions on company's Panel Vent sets for use at free delivery or relatively low static pressure. Units described have fan wheels of 24-, 30- and 36-in dia. DeBothezat Fans Div., American Machine & Metals, Inc.
See ad on page 34 for information on induced draft fans.

223 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 130. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.
See ad on page 135 for information on fans.

224 Fans and Blowers—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operation, maintenance and lubrication. Also discusses motors, special materials and coatings available. Several pages of excellent engineering data are provided, also visual index, photos of installations. Hartzell Propeller Fan Co.
See ad on page 174.

FUEL OILS, LUBRICANTS

225 The Why, What and How of Lubricants—This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.
See ad on page 99.

226 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.
See ad on page 27.

227 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.
See ad on page 52.

228 Lubricant Additive—This pamphlet describes a colloidal graphite dispersion in oil for blending with petroleum products, to use in lubricating internal combustion engines, industrial machinery; a concentrated dispersion of colloidal graphite in mineral spirits for use in high temperature lubrication. Acheson Colloids Corp.
See ad on page 43.

229 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.
See ad on inside front cover for information on lubrication engineering service.

INSTRUMENTS, CONTROLS

231 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure, low water, liquid level, bottles; transformer-relays, valves. The Mercoid Corp.
See ad on page 166.

232 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.
See ad on page 106.

Experience Proves Their Value!

MOBILIFT Stand-Up FORK LIFT TRUCKS

...More Maneuverable
...Quicker
...They Do More Work

Across the nation industries agree that MOBILIFT'S 15 years experience in building and improving STAND-UP fork lift trucks assures an efficient, hard-working truck . . . speedy and maneuverable in tight places.

Operators prefer MOBILIFT'S unobstructed visibility . . . easy, less fatiguing handling . . . safety.

Whether you need a 2,000-lb. capacity fork truck with 63" mast for loading and unloading trucks, or a 3,500-pounder with 72" mast and 110" lift for your warehouse . . . a MOBILIFT *Stand-Up* model will do your job quicker, safer, and at less cost.

Unequalled maneuverability . . . short turning radius . . . unobstructed forward-backward visibility . . . grouped push-pull, positive action controls . . . safe "deadman" brake . . . these and other exclusive features make MOBILIFT *Stand-Up* models equally fast and efficient in crowded or roomy work areas.

Lev-R-Matic DRIVE

Lev-R-Matic, grouped 2-way PUSH-PULL levers give instant, finger-tip control . . . forward, back, elevating, and tilting. MOBILIFT multiple disc clutch insures smooth, positive action . . . THERE ARE NO GEARS TO SHIFT!

Mobil-Chain Lift . . . Controlled power, roller-chain-operated lift allows unobstructed view between uprights.

MOBILIFT'S 3-cylinder heavy duty engine is air-cooled, compact, well-balanced and operates smoothly for long trouble-free service.

STAND-UP MODELS IN 2,000, 2,500, 3,000 and 3,500-POUND CAPACITIES are available with 63", 72" and 83" MASTS.
(Special Mast Heights to Order.)

WRITE TODAY FOR COMPLETE SPECIFICATIONS

MOBILIFT with Lev-R-Matic DRIVE

MOBILIFT CORPORATION

835 S. E. MAIN ST., PORTLAND 14, OREGON
2317 W. 18th, CHICAGO • 790 Patterson Ave., E. RUTHERFORD, N. J.
1113 Spring St. N. W., ATLANTA • 2724 Taylor St., DALLAS
2730 San Pablo Ave., BERKELEY

233 Electronic Control System—Bulletin A-701 introduces company's Autronic system, a miniature all-electronic system for controlling pressure, temperature, flow and level, intended for use in chemical processing plants, refineries, central stations, other applications where fast, accurate control is required. The Swartwout Co.
See ad on page 154 for information on ventilating louvers.

234 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Typical applications are also discussed. Illustrated. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.
See ad on page 114.

235 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.
See ad on page 169.

236 For Threefold Protection—Bulletin 1010B describes company's Air Warden unit for the protection of air-operated equipment. Explains how it is designed to filter air, regulate pressure and lubricate simultaneously. Hannifin Corp.
See ad on page 167.

237 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.
See ad on page 168 for information on control valves.

MAINTENANCE

238 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.
See ad on page 51.

239 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.
See ad on page 30.

240 Plant Paint Survey, Recommendation—This company will, upon request from a proper plant authority, make a plant survey to determine unusual operating conditions such as fumes, acids, alkalies, abrasions, moisture and the nature of any previous paint failure. After lab conferences, a recommendation based upon customer's needs and color scheme preferences is presented in booklet form tailor-made for that particular plant. Requests for this service MUST come from an authorized individual. Valdura Division, American-Marietta Co.
See ad on page 165.

241 Rust Preventives — Stressing water displacement as key to rust prevention, this 12-pp booklet tells how to choose rust preventives, ways to apply them to various surfaces. Outstanding properties of company's Stanorust products are discussed along with test data. Eight grades are described as to performance, best uses. Standard Oil Co. (Ind.)
See ad on page 63 for information on a multi-purpose industrial oil.

243 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.
See ad on page 168 for information on concrete floor patching.

Saved → $16,000.00 in one year

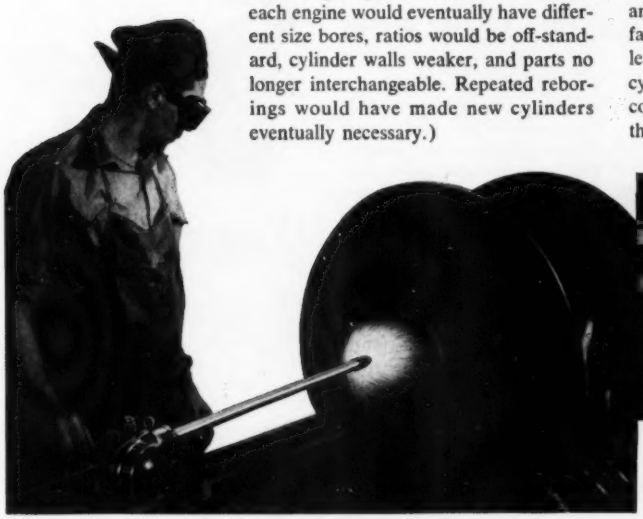
How one plant saved $16,000.00 in one year on one type of machine repair, with metallizing.

This large mid-West chemical plant uses fourteen gas engines, in compressor service, operating 24 hours a day. Fuel is a mixture of hydrogen, methane and air, with charcoal dust added to increase combustion efficiency.

Three methods of reconditioning these engines were available;

1. the cylinders could be replaced and standard sizes of other components preserved, at a cost of $450.00 per cylinder;
2. the cylinders could be rebored and fitted with oversized pistons and rings, at $400.00 per cylinder. (With this method, each engine would eventually have different size bores, ratios would be off-standard, cylinder walls weaker, and parts no longer interchangeable. Repeated reborings would have made new cylinders eventually necessary.)
3. Metallizing, at $125 to $150 a cylinder.

Cylinders are bored, threaded, grit-blasted, degreased and sprayed with Metcoloy #2 Stainless Steel, 20 to 30 pounds being applied. Cylinders are then finish-machined and honed to size. In the first year 64 cylinders were re-surfaced at a total saving of about $16,000.00, over the unsatisfactory method of reboring and fitting with oversized rings and pistons—$19,200.00 over the cost of new cylinders. Past experience with the greater particle hardness of sprayed metal, its better lubrication characteristics and the superiority of the stainless steel surface over the original cast steel cylinders leads this user to estimate that the rebuilt cylinders are good for another 15 years of continuous operation, about 50% more than the original life before reconditioning.



Gas engine—cylinders reconditioned with metallizing.

Gas engine cylinder—being metallized while rotating in improvised jig set-up.

Just One Example. This is just one among many money-saving applications of metallizing in this plant. Almost any rotating or sliding machine part subject to wear, can be reconditioned with this modern repair process. Parts are kept to standard sizes, replacement stocks can be cut, and production "downtime" caused by delivery delays or shortages of new parts is eliminated.

Further Information. Send off the coupon for a call by a factory-trained Metco Field Engineer, or a copy of Bulletin 54, *"Metallizing Saves Money"*.

The following trade names are the property of Metallizing Engineering Co., Inc., Metco®, Metcoloy ®Reg. U.S. Pat. Off.

METALLIZING ENGINEERING CO., INC.
38-14 30th Street — METCO — LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chobham near Woking, England

Don P. Watson
METALLIZING ENGINEERING CO., INC.
38-14 30th Street
Long Island City 1, N. Y.

☐ Please have Metco Field Engineer call.

☐ Please send me, without obligation, "METALLIZING SAVES MONEY".

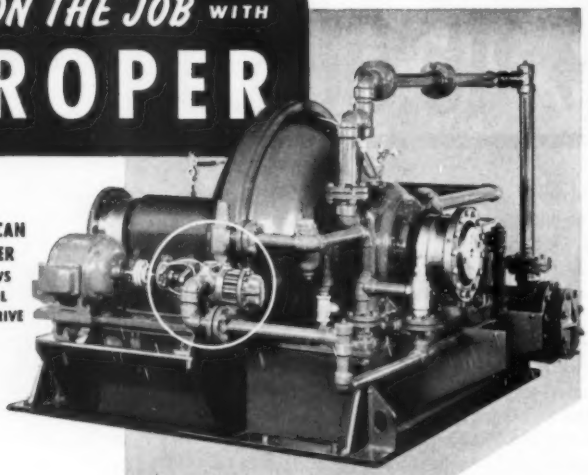
NAME_____

COMPANY_____

STREET_____

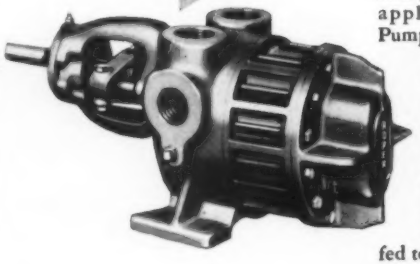
CITY_____ ZONE____ STATE_____

ON THE JOB WITH
ROPER



AMERICAN BLOWER TYPE VS GYROL FLUID DRIVE

ANOTHER EXAMPLE SHOWING ROPER PUMPS AS INTEGRAL PARTS OF MODERN MECHANISMS



Gyrol Fluid Drives — for supply pumps, compressors, draft fans, and other industrial applications — use Roper Pumps to govern speed variation. In this model, the oil is taken from the oil reservoir and is added to the Fluid Drive working circuit to increase speed, or oil is removed from the circuit to decrease speed. The lubricating oil is constantly fed to all bearings. The Fluid Drive unit shown is a size 27 Type VS with maximum ratings of 518 HP at 1400 RPM.

SERIES F PUMP

Roper Series F Pumps — the models used as original equipment on Gyrol Fluid Drives — are recommended for pressures up to 300 PSI and come in 1 — 300 GPM sizes. They feature 4-port design offering eight optional piping arrangements (4 for CW and 4 for CCW rotations) . . . a factor which cuts installation time and costs. Equal size gears run in axial hydraulic balance; pumps furnished in standard or stainless steel fitted models; available with or without relief valve — with mechanical seal or packed box. Investigate what Roper Rotary Pumps can do for you!

SEE OUR CATALOG IN SWEET'S

GEO. D. ROPER CORP.
147 BLACKHAWK PARK AVE.
ROCKFORD • ILLINOIS

ROPER
Rotary Pumps

244 Floor Maintenance—This 12-pp brochure presents a complete and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing. The Tremco Mfg. Co.
See ad on page 158 for information on mechanized roof maintenance.

245 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.
See ad on page 127 for information on corrosion resistant coatings.

246 Basic Roofing Information—"What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, special features of company's roofing materials. Explanations are brief, suggestions practical. Johns-Manville.
See ad on page 153.

247 Power Brushes—Bulletin C-269, describing company's new power brushes, pictures their design. The Osborn Mfg. Co.
See ad on page 22.

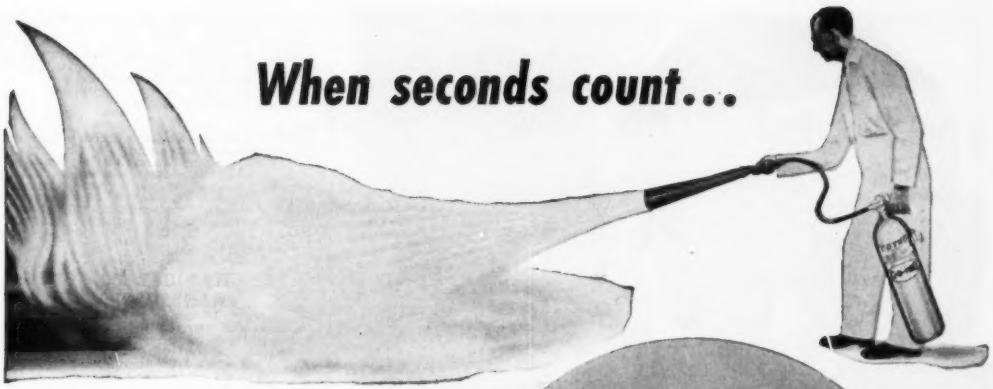
248 Case Histories on Brushing Problems—The solutions to 12 industrial brushing problems are told in this 32-pp illustrated booklet. Shows how rotary wire brushes, specially selected or engineered for the job, are used to perform abrading, cleaning and finishing jobs. Brush Div., Pittsburgh Plate Glass Co.
See ad on page 173.

249 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled "Here's How To Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Divs., American Chain & Cable Co., Inc.
See ad on page 40 for information on slings and fittings.

CONSTRUCTION

251 Construction Handbook—This is the 56-pp 1952 edition of company's Architects' and Engineers' Reference Manual covering built-up flat and steep roofing, flashing, roof drainage, waterproofing and dampproofing. Fully illustrated, provides specifications, application information. Presents most practical methods and procedures, showing construction secured when specifications are followed. Available to qualified plant engineers; please state title when requesting this book. The Barrett Div., Allied Chemical & Dye Corp.
See ad on page 118.

252 Building Panel Engineering Data—This 40-pp reference book for use of steel



C-O-TWO SQUEEZ-GRIP

assures speedy action!

A quick squeeze of the lever and you get fast, positive fire protection with C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers . . . no loss of time or carbon dioxide while maneuvering around a fire. The C-O-TWO Squeez-Grip Valve is the greatest single contribution to the releasing of carbon dioxide for first aid fire fighting. Easy maintenance . . . only periodic weight checks required . . . carbon dioxide is good until used, not subject to freezing.

Carbon dioxide is a clean, dry, non-damaging, non-conducting, odorless inert gas . . . dilutes the oxygen content to a point where fire can not exist . . . penetrates every nook and corner. Carbon dioxide is one of the fastest and safest fire extinguishing agents known . . . equipment, materials and finishes remain undamaged . . . surfaces stay dry and even food remains perfectly edible. After the fire, carbon dioxide disappears quickly without a trace.

Quality built and fully approved . . . C-O-TWO Squeez-Grip Carbon Dioxide Type Fire Extinguishers are highly effective on flammable liquid and electrical fires, as well as some surface fires involving ordinary combustible materials . . . rated by Underwriters' Laboratories, Inc. and Factory Mutual Laboratories for class B and C fires.

Convenient 2½, 5, 10, 15 and 20 pound hand sizes . . . discharge horn non-conducting, corrosion resistant, shatterproof, non-metallic construction.

Also, convenient 50, 75 and 100 pound wheeled sizes . . . available with sturdy, wide-faced wheels either with or without rubber tires, as well as available with or without discharge hose and horn protection cover.

Act now for complete free information on these top quality fire extinguishers. Remember . . . you can't put fire off . . . fire doesn't wait. Get the facts today!

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY
Sales and Service in the Principal Cities of United States and Canada
Affiliated with Pyrene Manufacturing Company
MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT
Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers • Built-In Smoke and Heat Fire Detecting Systems
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

YOU'RE kidding YOURSELF if you think every safety valve is equally safe.

We know of one case where inspection showed that 27 out of 36 safety valves were stuck tight—*would not have operated at pressures far above the set point*—yet the user of those valves *thought* he had protection. He *could* have been stuck right along with those 27 valves.

If you want 100 per cent safety—and you'd hardly want less—there's one sure way to get it—specify BalanSeal or FarriSeal Safety Valves.

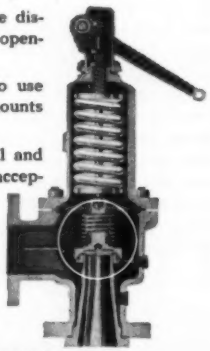
Why? Because they *can't* stick, plug or corrode. Critical working parts are permanently isolated from any contact whatever with the lading.

Because they're unaffected by back pressures in the discharge manifold due to its own operation or to the opening of other valves in the line.

Because these features make it possible for you to use smaller discharge piping, an economy which often amounts to substantially more than the cost of the valves.

You'll be interested in the engineering of BalanSeal and FarriSeal Valves—design which is rapidly gaining acceptance in hundreds of successful installations.

Ask for our "8-Minute Brief."



1189 R

Your Safety's REAL With FarriSeal

Farris ENGINEERING CORP.

416 COMMERCIAL AVE., PALISADES PARK, N. J.

AFFILIATES

Farris Stacon Corp. Temperature Regulators • Farris Flexible Valve Corp. Pinch Type Farris Hydrotorque Corp. Remote Controls • Farris Hydroseal Corp. Elastic Piston Seals

and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Detroit Steel Products Co.
See ad on page 64 for information on galvanized steel windows.

253 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.
See ad on page 169.

MECHANICAL POWER TRANSMISSION

254 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.
See ad on page 95.

255 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.
See ad on page 166.

256 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, dimensions and list prices. Boston Woven Hose & Rubber Co.
See ad on page 58 for information on maintenance of V-belts.

257 Manual on V-Belt Drives—Catalog 280 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. List prices, dimensions included, also a 12-pp supplement on cog belt drives. The Dayton Rubber Co.
See ad on page 47.

258 Improved V-Belts — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.
See ad on page 15 for information on special V-belt drives.

259 Hydraulic Drive—The Hydro-Sheave, hydraulic power transmission unit, designed for immediate application to electric motors and internal combustion engines in ¾ to 40 hp range is described in illustrated Bulletin 145-B. Tells how this unit combines advantages of a fluid drive, offers operators of small power units a low cost conversion device as easily applied as a sheave. Applications listed, engineering data included. Twin Disc Clutch Co.
See ad on page 134.

DUST CONTROL

261 Industrial Dust Control—In addition to citing several examples of how company's Dustube collectors are solving the dust control problem in different industries, Vol. 1, No. 1 of Industrial Ventilation explains merits of cloth filtration. American Wheelabrator & Equipment Corp.
See ad on page 159.

262 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.
See ad on page 162.

263 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capaci-

You get EXTRA advantages with

LO-HED HOISTS

DESIGNED to operate with top speed and ease . . . built for longer working life . . . Lo-Hed Hoist has cut material handling costs in plants from coast to coast.

And beyond that, Lo-Hed has *extra* features that bring maximum safety and efficiency. Its bottom block, for example, is completely shrouded. On A.C. installations a transformer puts 110 volts instead of line voltage at the push button controls. Its hook is suspended on an oil-impregnated bearing that does away with tangled lines.

Available in five suspension types and in capacity ranges from 500 to 24,000 lbs., Lo-Hed gives you low headroom, too, for which you pay no premium. Mail the coupon below for complete information . . . it may lead to savings that count up, year after year.

LO-HED MEANS LOW OVERHEAD

LO-HED CAR PULLER . . . rugged . . . electrically-driven . . . moves railroad cars on private sidings cheaply and safely . . . cuts demurrage costs . . . Saves money *inside* a plant, too; pulls anything within its capacity that can roll or slide . . . up grades, around corners.

AMERICAN ENGINEERING

COMPANY

PHILADELPHIA 25, PENNA.

AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Helo-Shaw and Hydramite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers.

American Engineering Company
2503 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: I am certainly interested in efficiency. Send me full information about ☐ Lo-Hed Hoists . . . ☐ Lo-Hed Car Pullers.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Koiled Kords*

BEFORE

eliminate wire jungles

AFTER

and increase efficiency

*TRADEMARK

"Before and after" pictures courtesy the Miller Company, Meriden, Conn.

Get rid of that tangled, jumbled jungle of inefficient wiring on electrical tools that move. Use Koiled Kords in the plant or on your products and increase efficiency, minimize accident hazards and cut replacement costs.

Koiled Kords are neoprene jacketed electric cords of high quality that are permanently coiled into a spring-like shape which provides for extension and retraction.

Koiled Kords are made with from one to six conductors and may be purchased in mandrel lengths four feet long and used just like straight cords are used. When required Koiled Kords are made to customers' specifications in combination of coiled and straight lengths with or without terminals.

For specific information for your own application of Koiled Kords write in full detail. Koiled Kords will be glad to work with you.

Koiled Kords
INCORPORATED

BOX K, HAMDEN, CONN.

IN CANADA: R. D. FLECK AND COMPANY LIMITED, OSHAWA, ONT.

ties, sizes. The Kirk & Blum Mfg. Co. *See ad on page 62 for information on fume control system.*

264 Wet Method Dust Collection — Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 22-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function operations, settling and dewatering equipment. Claude B. Schneible Co.
See ad on page 126.

265 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Discusses control of air movements. Pangborn Corp.
See ad on page 32 for information on blast cleaning.

266 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

ELECTRICAL

267 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.
See ad on page 115 for information on adjustable speed drives.

268 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contractors; synchronous and high voltage starters; d-c control relays, contractors, starters; drum switches, a-c d-c rheostats, speed regulators; push buttons, limit switches, and accessories. Allen-Bradley Co.
See ad on page 116 for information on manual starters.

See pages 35-36 and 141-142 for postage-free cards. Use them to request catalogs . . . just list item numbers of all those you'd like to have.

269 Enclosed Motors—Construction features and details of totally-enclosed, fan-cooled motors with tube-type air-to-air heat exchangers in ratings from 40 hp at 600 rpm through 800 hp at 3600 rpm are described in Bulletin 51B748B. Points out that these motors come in standard and explosion-proof designs, the former for applications without explosion hazards but requiring protection from dust, fumes. Allis-Chalmers Mfg. Co.
See ad on page 45 for information on other enclosed motors.

270 Motor Panorama—Motors and generators—about 50 types in all—are pictured in Publication AEB 100.8B, which serves as a handy reference, since it lists specific literature dealing with each motor shown. Gives general construction details of each unit. Fairbanks, Morse & Co.
See ad on page 113.

271 Big Induction Motors—Design and application features of Company's Life-Line motors (now made in ratings to 700 hp) are described in 20-pp Booklet B-4731. Applications of these motors in the

JENKINS PRACTICAL PIPING LAYOUTS 61

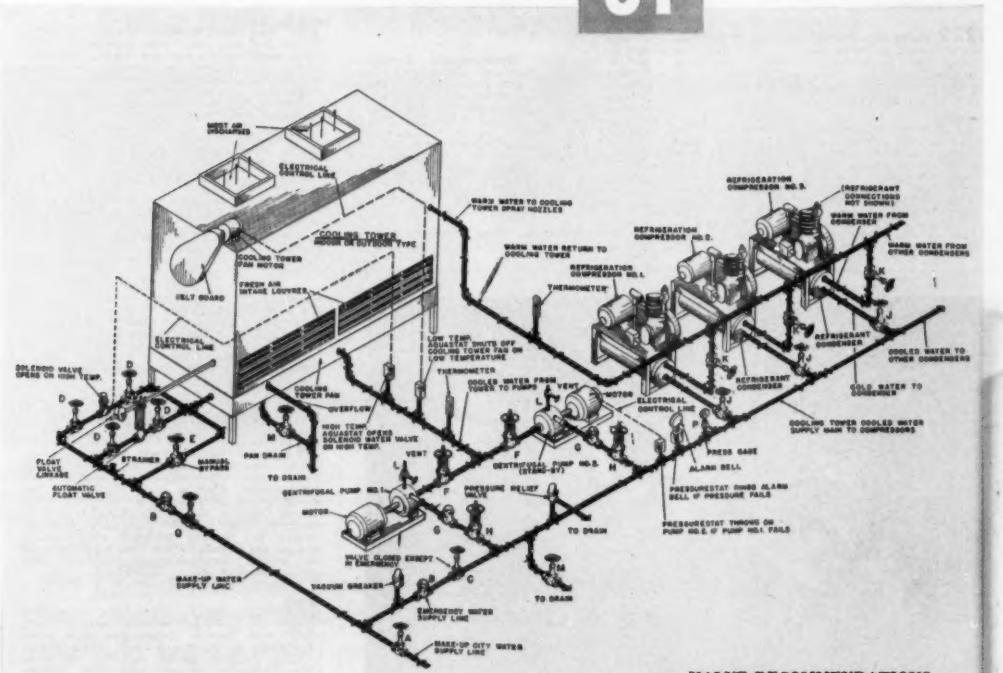


Diagram by Huxley Modelheim Consulting Engineer

COPYRIGHT, 1952 — JENKINS BROS.

How to plan a COOLING WATER SYSTEM FOR REFRIGERATION COMPRESSORS

Facilities for cold storage of frozen and perishable foods in super markets, hotels, restaurants and institutions are being expanded rapidly, creating a demand for small refrigeration compressors like the one illustrated.

In this cooling system provisions have been made to cope with all emergency conditions. These include piping for re-use and conservation of water. Moreover, should temperature of the water in the system rise above normal, fresh water is automatically introduced through a solenoid valve operated by a thermostat in the supply line.

Duplicate water circulating pumps insure continuous cool water supply to compressors since water-pressure failure in one automatically cuts in on the standby pump. To provide for the remote possibility of both pumps failing, an alarm system warns operator to turn on the emergency manually-controlled water supply.

Consultation with piping engineers is recommended when planning any major piping installations.

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering, select all the valves you need from Jenkins complete line. It's your best assurance of *lowest cost in the long run.* Jenkins Bros., 100 Park Ave., New York 17; Jenkins Bros., Ltd., Montreal.

COMPLETE DESCRIPTION AND ENLARGED DIAGRAM OF THIS LAYOUT FREE ON REQUEST. Includes additional detailed information. Ask for Piping Layout No. 61.

VALVE RECOMMENDATIONS
For details of valves to suit varying conditions, see Jenkins Catalog.

Code	Quan.	Jenkins Valves	Services
A	1	Fig. 47 Bronze Gate	Main Water Supply Shutoff
B	2	Fig. 352 Swing Check	Prevent Backflow
C	1	Fig. 47 Bronze Gate	Emergency Water Supply Shutoff
D	4	Fig. 47 Bronze Gate	Automatic Valve Shutoff
E	1	Fig. 106-A Bronze Globe	Manual Bypass of Automatic Valves
F	2	Fig. 368 Bronze Gate	Pump Suction Shutoff
G	2	Fig. 352 Br. Swing Checks	Prevent Backflow to Pumps
H	2	Fig. 368 Bronze Gate	Pump Discharge Control
J	3	Fig. 106-A Bronze Globe	Control Water to Condensors
K	3	Fig. 370 Bronze Gate	Condensor Discharge Shutoff
L	2	Fig. 743-G Bronze Needle	Pump Vent Control
M	2	Fig. 106-A Bronze Globe	Drain Valves
P	1	Fig. 743-G Bronze Needle	Pressure Gage Control
Q	1	Fig. 47 Bronze Gate	Make up Supply Line

JENKINS
LOOK FOR THE DIAMOND MARK
VALVES

paper, chemical, central station, mining, lumber and metal-working industries are illustrated. Separate sections describe the special construction of motor frames, end brackets, stators, rotors, and bearings. Westinghouse Electric Corp.
See ad on page 105 for information on line starters.

272 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently coiled, neoprene jacketed electric cords which expand to 5 times retracted length. Koiled Kords, Inc.
See ad on page 150.

273 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Gives standard reel sizes and capacities, standard specifications. Rome Cable Corp.
See ad on page 101 for information on thermoplastic insulated cables.

274 Circuit Breaker Reference Data — Catalog Section 5000 is a collection of more than 30 data sheets providing selection and application information anad ordering instructions for company's molded case circuit breakers. Fully illustrated, includes ratings, current carrying capacities, dimensions, prices. I-T-E Circuit Breaker Co.
See ad on pages 56-57.

275 Electrical Maintenance Service — Booklet B-4766, 24 pp, on company's maintenance service for electrical apparatus presents a program of renewal parts, repair service plants and company's engineering and field service. Photos show skill, testing devices and repair equipment available through strategically located repair plants. Improved design renewal parts are illustrated. Motor exchange service, inspection service and "on the spot" repairs described. Westinghouse Electric Corp.
See ad on pages 8-9 and 38.

276 Distribution Duct Engineering Data —Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating diagrams, layout symbols. BullDog Electric Products Co.
See ad on page 125.

277 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, lighting systems, etc. Tells where bus duct can be used to advantage. Dimensions given. Westinghouse Electric Corp.
See ad on page 155.

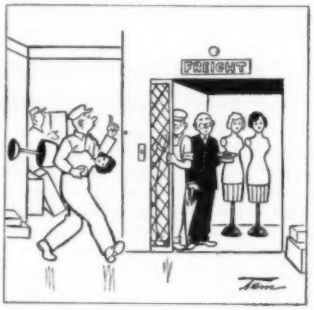
278 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. Trumbull Dept., General Electric Co.
See ad on page 97 for information on panelboards.

279 Overload Relays—Bulletin 1180-3 is a technical data sheet on overload relays designed to combine advantages of thermal and magnetic tripping characteristics for protecting a-c motors. Pictures design details. The Electric Controller & Mfg. Co.
See ad on page 131.

MATERIALS HANDLING

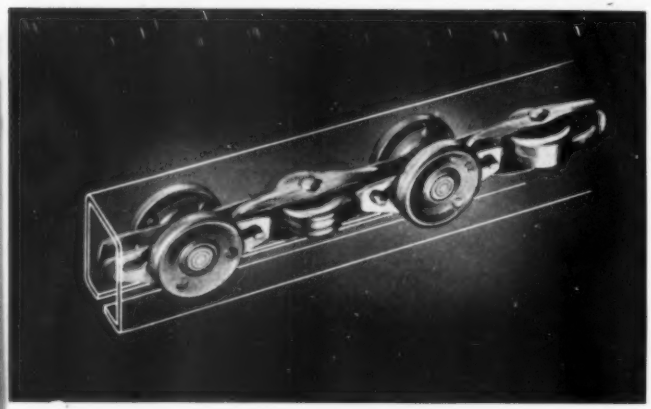
281 Space Saving Fork Trucks—Operational features, engineering details and maintenance advantages of maufacturer's Spacemaster electric fork trucks are described and illustrated in recently published Catalog 32, 20 pp. Trucks covered are from 1000- to 4000-lb capacity. Also included are special purpose attachments and accessories for extending usefulness of the trucks. Lewis-Shepard Products Inc.
See ad on page 39.

282 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.
See ad on page 137 for information on materials handling equipment.



283 Materials Handling Equipment — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.
See ad on page 107 for information on hand and electric hoists.

284 Hydraulic Lift Trucks—This catalog provides engineering and ordering information on manufacturer's complete Weld-Bilt line of hydraulic lift trucks in 2500- to 10,000-lb capacities. Also covers skid platforms, pallet lift trucks, two-wheel trucks. West Bend Equipment Corp.
See ad on page 162 for information on mechanical lift trucks.



Chain your costs down

with R-W "Zig-Zag" Continuous Power Conveyor

Richards-Wilcox "Zig-Zag" Continuous Power Conveyor is a specially constructed, motor-driven chain that travels through a steel, tube-like track. The unit is continuous; travels up and down, in and around, anywhere in the plant; carrying loads up to 125 pounds at all speeds from 1 inch to 60 feet per minute. Installation is easy and inexpensive, and may be quickly adapted to conform to plant alterations. Among its major advantages, "Zig-Zag" puts "dead" space to work—releases personnel for other duties—increases efficiency and keeps costs down.

Write for *complete information, or contact your nearest Richards-Wilcox engineering office for consultation at no obligation.*

Your best buy for economy and flexibility!

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs—low power factor.
- Standard horizontal and vertical curves—two-foot radius.

Richards-Wilcox Mfg. Co.
"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A. Branches in all principal cities
SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS
ELEVATOR DOOR OPERATING EQUIPMENT

1880 RICHARDS WILCOX R-W ILLINOIS 1952
Reg. U. S. Pat. Off.
OVER 72 YEARS

DON'T TAKE YOUR ROOF FOR GRANTED

Get a Built-Up Roof Survey *FREE* of charge!

Water entering masonry parapet and abutting walls often freezes—causing spalling or open brick joints which lead to leaks and damage to the building.

Expansion and contraction, vibration or other distortion often cause cracks in the roof deck—cracks that develop into costly leaks and accelerate roof deterioration.

The *FREE* Roof Survey Report helps you avoid costly roof failures such as those shown above. It tells exactly what condition your roof is in, helps you plan roofing maintenance.

EVEN though your roof doesn't *seem* to be leaking, it may be in need of attention. Many a roof with torn flashings, dried-out felts, even rotted decks has been assumed to be in "good condition."

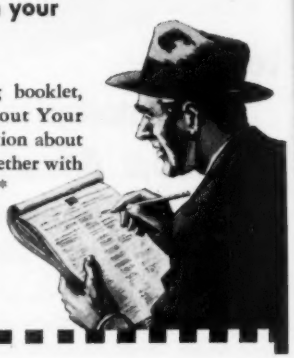
To anticipate costly damage, often hidden, and numerous repair bills, hundreds of plant engineers and maintenance executives have already used the free Johns-Manville Roof Survey Report.

The Roof Survey Report is an accurate picture made by a roofing *expert,* the J-M approved Built-Up Roofing Contractor. It covers all critical areas—flashings, decks, roofing felts, parapet walls, skylights, etc. And it will cost you only the trouble of asking for it.

JOHNS-MANVILLE JM PRODUCTS

•Reg. U. S. Pat. Off.

Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan together with the full story of the J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Dept. PE, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ont.



Get this free survey now!

Johns-Manville, Box 158,
Dept. PE, New York 16, N. Y.

Please send me the free booklet, "Things You Should Know About Your Roof," and have your Approved Built-Up Roofing Contractor see us about making a free survey.

Name _____

Address _____

Johns-Manville *FLEXSTONE Built-Up Roofs**

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

285 Stand-Up Fork Lifts — Complete specifications are available on stand-up fork lift trucks in 2000- to 3500-lb capacities. These trucks feature easy maneuverability and manufacturer's Lev-R-Matic drive. Mobilift Corp.
See ad on page 144.

286 Fork Lift Trucks — Just released, these three attractively illustrated bulletins provide dimensions, specifications and operating data on gasoline-powered and diesel-powered fork lift trucks. Bulletin 1579 covers units of 3000-lb capacity at 24-in. load center; Bulletin 1580, 4000-lb at 18-in.; and Bulletin 1581, 4000-lb at 24-in. All available to qualified plant engineers, state those wanted. The Buda Co.
See ad on page 117.

287 For Efficient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.
See ad on page 28.

288 Data on Tramrail Equipment — Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.
See ad on inside back cover.

289 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.
See ad on page 152 for information on a continuous power conveyor.

Low cost—
low contour;
Swartwout Airmover combines
these important advantages in large scale ventilation

You can make wide use of Airmover's many advantages for a large variety of buildings. In this exclusive Swartwout Ventilator design you get (1) great exhaust capacity without power cost; (2) low, spreading contour that eases roof load, enhances the building's appearance, and avoids stays and guy-wires; and (3) provides lowest cost ventilation per square foot of roof opening.

Airmover can be applied to any type of roof. It's completely weatherproof; has adjustable damper for varied opening. Its low-air-friction design assures high capacity gravity exhaust. Write for Folder 326-D.

18511 Euclid Avenue, Cleveland 12, Ohio

The **Swartwout Co.**

Roof Ventilators and Ventilating Louvers

POWER PLANT EQUIPMENT • PROCESS INDUSTRY CONTROLS

290 Conveyor and Elevator Belts—This 28-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.
See ad on page 3 for information on grommet V-belts.

291 Rough Top for Belts—Five designs of rough top surfaces which can be put on company's conveyor belts are pictured in Bulletin A-5148-K. Recommended applications for each design are discussed briefly. Goodyear Tire & Rubber Co.
See ad on back cover for information on steel cable V-belts.

292 Hydraulic Jacks—Hand wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. Illustrated, includes specifications, selection information. Blackhawk Mfg. Co.
See ad on pages 16-17 for information on an idea book on tools.

293 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.
See ad on page 149 for information on low overhead hoists.

Use the postage-free cards provided for you on pages 35-36 and 141-142 for requesting catalogs. List item numbers of those wanted.

294 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.
See ad on page 4 for information on an aluminum chain block.

295 Trolley Hoists—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.
See ad on page 41.

296 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.
See ad on page 156.

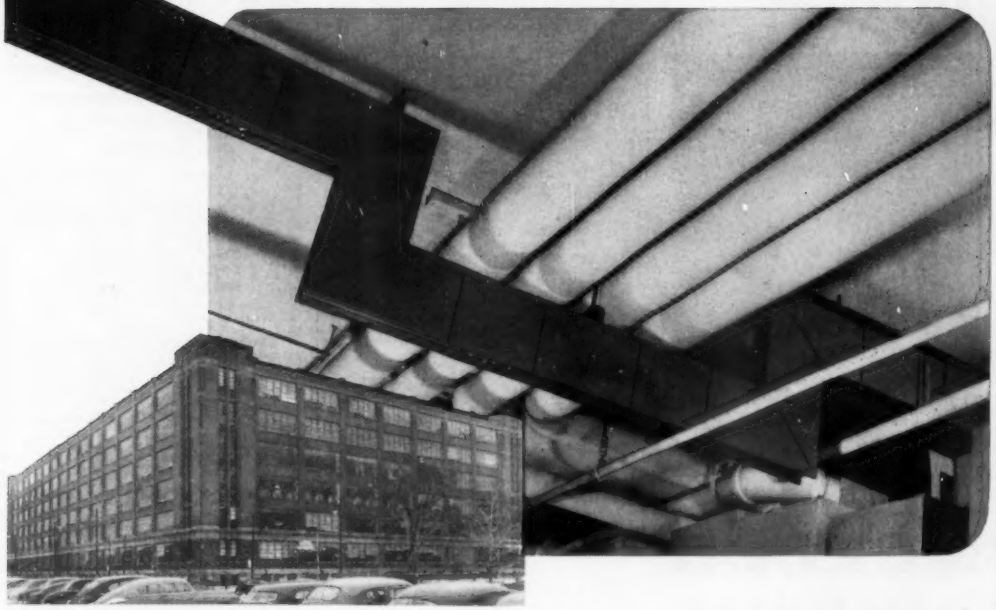
297 Single Drum Hoist—Sixteen-pp Bulletin 76-X describes single-drum, portable multi-purpose hoists for industrial plants, construction work. Joy Mfg. Co.
See ad on page 23 for information on heavy duty air compressors.

298 Hints on Hoists—Now available to plant engineers is "144 Answers to Your Hoisting Problems." Shows how proper choice and use of hoist can step up production and cut handling costs. Reading Crane & Hoist Corp.
See ad on page 158.

299 Fast-Working Hoists — Bulletin W-815-B, 6 pp, provides electrical details on company's hoists — on wiring, brakes, motors and fast-operating, push-button controls. Standard outrig, and multi-speed controls, limit switches are described. Hoist & Crane Div., Robbins & Myers, Inc.
See ad on page 132.

300 Electric Lifters—Medium and heavy-duty electric lifters are described and illustrated in Bulletin LU50. Company's ball bearing hoisting unit is discussed. Economy Engineering Co.
See ad on page 167.

BUS DUCT IS FLEXIBLE



Parke, Davis & Company plant modernizes with Westinghouse Bus Duct

"Neat . . . clean . . . flexible!", say Parke, Davis & Company engineers about the installation. The contractor reports, "My men liked installing Westinghouse Bus Duct . . . and the ease of mounting it around pipes, through walls and across wide open spaces saved us considerable time and money."

This vast installation of standardized Low Impedance and Plug-In Bus Duct has recently been completed at the Parke, Davis & Company, Detroit, Michigan, where a complete changeover was made from a d-c to an a-c system.

This duct has greater current-carrying capacity pound for pound than any other means of secondary power distribution. Plug-In Duct has outlets every foot to allow for rapid machine tie-ins. Duct sections are fully salvageable and can be expanded or relocated with little effort.

Four types of Westinghouse Bus Duct are available to meet any load condition and service requirement. Call your Westinghouse Representative for complete details or write for B-4272-A. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-30107

YOU CAN BE SURE... IF IT'S Westinghouse

BUS DUCT

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

for control

Keller Hoist lifts fragile wet ceramic unit out of its mold

KELLER air hoist

The operator of a Keller Air Hoist has instantaneous, positive control of every movement. He can raise or lower at any speed from a creep to 17 fpm*. He can reverse at will, because an air motor is not injured by repeated rapid reversal . . . nor can it be damaged by prolonged stalling.

Other advantages of the Keller Air Hoist include light weight (30 lb*), small size (5" x 5" x 15"*), safety, and low maintenance.

**for 1000-lb hoist. Capacities of 300 and 2000 lb also available.*

KELLER

Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

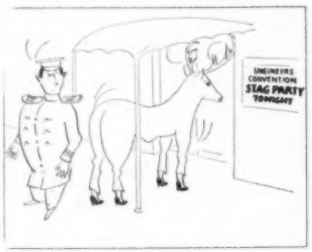
301 Hose Reels — Here's an illustrated data sheet covering company's Retriever hose reels which handle water, oil or air. Presents specifications on open and drum types. Explains how reels save space, afford increased safety. The Wayne Pump Co.
See ad on page 120 for information on compressors.

302 Steel Wire Pallets—This is an illustrated specification sheet covering a basic steel pallet for shipping, storing, and stacking jobs. Mesh detail and some typical applications are pictured. Union Steel Products Co.
See ad on page 29.

TOOLS

303 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.
See ad on page 171.

304 Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives sizes, prices. Armstrong Bros. Tool Co.
See ad on page 166.



305 Radial Arm Saws—This 12-pp catalog describes company's full line of radial arm saws for industrial, other uses. Complete specifications of four models given. Special accessories are illustrated. Delta Power Tool Div., Rockwell Mfg. Co.
See ad on page 67.

306 Standard Screw Products—This 10-pp booklet about "Unbrako" standards tells what they are and the advantages of their use. Gives detailed information on socket head, cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts. Standard Pressed Steel Co.
See ad on page 19 for information on unit work benches.

307 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for tool-post mounting or hand operation. Metallizing Engineering Co., Inc.
See ad on page 145 for information on metallizing.

308 Stud Driver—Special operating features of company's Model 450, a self-powered quick fastening tool, are detailed in Form 937A. Photos show how the driver is used and picture it in action. Industrial Tool Div., Remington Arms Co., Inc.
See ad on page 65.

LIGHTING

309 Recommended Lighting Systems—This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.
See ad on page 31 for information on outdoor industrial lighting.

LIKE AN **ATOM-IC** EXPLOSION

Just 1/32" (pinhole size) faucet leak

MUSHROOMS into ATOMIC WASTE

of approximately 95,000 gallons of water yearly—costing:

$24.14

@ $1.90 per M cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:

$88.91 if coal (9879 lbs.)
$91.08 if oil (792 gals.)
$84.41 if gas (84,411 cu. ft.)

Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.

"EASY-TITE" FAUCET WASHERS

. . . a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems — that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape . . . causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. *Send for your copy today!*

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

A postcard will bring him and your NEW Catalog promptly.

J. A. SEXAUER MFG. CO., INC. Dept. S-72
2503-05 Third Avenue, New York 51.

as advertised in the SATURDAY EVENING POST

SEXAUER

WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

housing projects ↓ *Logan Fontenelle Homes, Omaha, Nebraska*
Architect: Housing Architects, Assoc., Omaha, Nebraska
Consult. Engr.: H. S. Seymour, Omaha, Nebraska

Why Dunham Vari-Vac Heating

Cuts fuel costs up to 40%

Fuel savings up to 40% are not uncommon with Dunham Vari-Vac* Differential Heating. That's because this high vacuum, precision temperature control system *uses less steam* to heat any building . . . regardless of its size, type, age, or location.

Less steam . . . more comfort. Vari-Vac saves fuel on mild days by *expanding* smaller amounts of "cool" sub-atmospheric steam. In *any* weather Vari-Vac compensates instantly for all outside temperature changes to deliver the *exact* amount of heat needed.

Choice of systems. Seven different Vari-Vac systems available, depending on degree of automatic control desired. For complete information, see your Dunham Sales Engineer . . . or ask for Bulletin 2101-20.

**Variable Vacuum*

office buildings ↑ *Packard Motor Company Car Assembly Office Bldg., Detroit, Michigan*
Architect & Consult. Engr.: Albert Kahn Assoc., Detroit, Michigan

Send for Free Booklet 2101-20

Tells all you will need to know about this amazing system—how it operates, how it may be fitted exactly to your needs. Write for your copy.

DUNHAM

heating systems and equipment

C. A. DUNHAM COMPANY
400 W. Madison Street, Chicago 6, Illinois
In Canada: C. A. Dunham Co., Ltd., Toronto
In England: C. A. Dunham Co., Ltd., London
Radiation • Unit Heaters • Pumps • Specialties

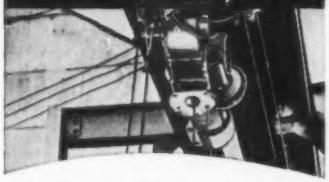
Instantaneous response to outside weather changes.

Convenience of centralized operation.

Automatic compensation for heat loss.

Heat supply and demand perfectly balanced.

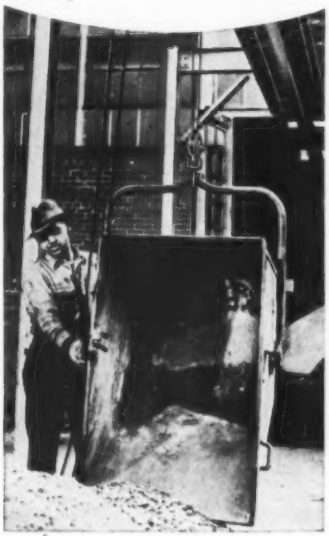
This Hoist
LIFTS PRODUCTION
LOWERS COSTS
Here's Why...



Each READING ELECTRIC HOIST installed in your plant is "tailor made"—at no extra cost—to fit your own handling operation. As a result you get a hoist that quickly moves your materials safely and easily.

Then too, the simple design of a READING ELECTRIC HOIST gives you a sure way to cut maintenance costs. There are only four moving parts in the hoisting unit. Each part is "easy-to-get-at" for routine inspection and overhauling.

For more information on how you can step-up production and cut costs with READING ELECTRIC HOISTS, contact your nearest Reading Distributor. And if you haven't already sent for your free copy of "144 Answers To Your Hoisting Problems," drop us a line today.



READING CRANE & HOIST CORPORATION
2103 ADAMS ST., READING, PA.
CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

310 Lighting Fixtures—Full information on company's fluorescent lighting fixtures designed for efficient industrial lighting and reduced maintenance is provided in Form OD-568. Day-Brite Lighting, Inc. *See ad on page 108.*

311 Series Sequence Ballast — Bulletin 551-11 announces a new series sequence 430 ma ballast for series operation of two 96T12 fluorescent lamps. Illustrates ballast, includes weight, dimensions, wiring diagram. Jefferson Electric Co. *See ad on page 53 for information on power circuit transformers.*

PUMPS, COMPRESSORS

312 Centrifugal Pumps — Described and illustrated in Bulletin 50-9900 are a cross section of an extensive line of centrifugal pumps. Includes heavy-duty Bilt-on pump, a pneumatic sponge pump, deep well and submersible pumps. Byron-Jackson Co. *See ad on page 11 for information on mechanical seals.*

313 Rotary Pumps — Bulletin WQ-50, 8 pp, describes Warren-Quimby Rotex pumps, illustrating design features by both sectional and exterior views. Engineering data, selection charts and dimensions are included. Warren Steam Pump Co., Inc. *See ad on page 130 for information on boiler feed pumps.*

314 "A Turn for the Better"—Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump. Pump Div., Robbins & Myers, Inc. *See ad on page 42.*

315 How to Solve Pumping Problems—Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction list and discharge head, determine direction of rotation and size of speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp. *See ad on page 146.*

316 Compressor Selection Chart — Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp. *See ad on page 60 for information on positive displacement pumps.*

317 Rotary Compressors—Bulletin C-6 is company's most recent on rotary compressors. Fully illustrated, provides sketches of intake regulator, and bearing and ring assemblies, also photos of installations. Explains operation. Fuller Co. *See ad on page 66.*

REFRACTORIES, INSULATION

319 Rugged Refractories—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to atrasion, spalling, thermal shock. The Carborundum Co. *See ad on pages 20-21.*

320 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Lists the wide selection of shapes and sizes available to insulate tubes and pipes from ¼ to 72 in. dia and vessels from 72 in. to 60 ft, also flat surfaces. Also gives data on physical characteristics, thicknesses. Kaylo Div., Owens-Illinois Glass Co. *See ad on page 37 for information on insulating roof tile.*

*Mechanized Maintenance**
—saved this roof!
Saved labor, time and dollars for its owner

*** A MECHANIZED GRAVEL REMOVER,** operated by one man, loosened the gravel and exposed the clean roof mat of the Old Goff Mills building in Pawtucket, R.I.... as fast as six men could do the job by hand spudding. Dry spots and cracks were readily accessible—easily repaired.

*** A MECHANIZED ROOFING PUMP** delivered Tremco Roofing Preservatives from the ground, 65 feet up the side of the building, right to the dry felts. Resaturation was speedily accomplished ...with no spillage...with one man doing the work of four.

THE TREMCO MAN recommended these Mechanized Maintenance methods after careful examination of this roof. Result: a revitalized roof that will give years of low maintenance service. And the job was done with substantial savings in time and labor! Write for 32-page booklet, "Solving Roof Problems". The Tremco Manufacturing Company, Cleveland, Ohio, or The Tremco Manufacturing Company (Canada) Ltd., Toronto.

TREMCO
PRODUCTS AND METHODS FOR BUILDING MAINTENANCE
(UM-1017)

321 Fiberglas Bibliography—This is the new, 88-pp third edition of a volume of annotated references to selected articles on Fiberglas products which have appeared in the nation's press. Uses of Fiberglas products documented in the book include such applications as refrigerating equipment, water heaters, forced warm air furnaces, reinforced cable, storage batteries. Owens-Corning Fiberglas Corp.
See ad on page 119 for information on Fiberglas air filters.

322 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight, and physical stability. Union Asbestos & Rubber Co.
See ad on page 103.

PACKINGS

323 Buyer's Guide on Packings—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co.
See ad on page 164.

324 Industrial Gaskets — This recently published 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon packing and expansion joints and teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co.
See ad on page 50.

STEAM GENERATORS

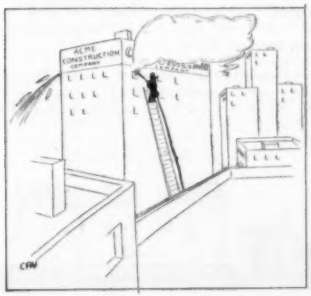
325 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.
See ad on page 55 for information on vertical unit boilers.

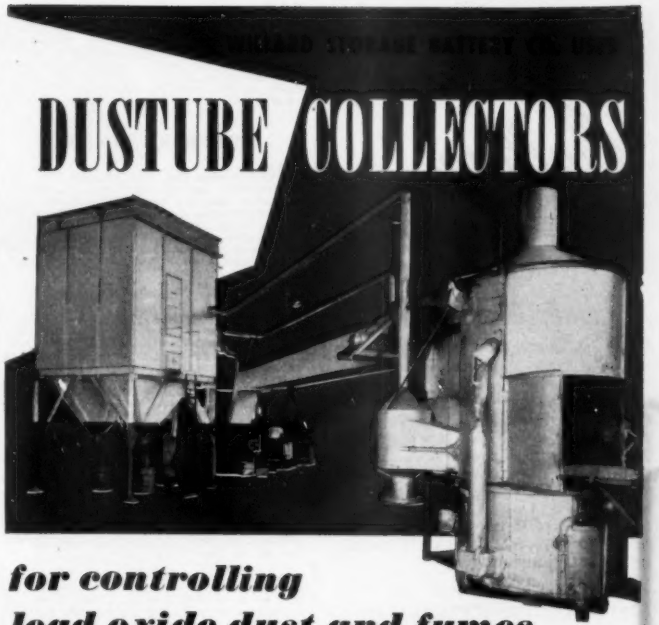
326 Steam Generators—Bulletin 1218 on company's Powermaster units for steam or hot water use. Describes high or low pressure units from 15 to 500 hp. Gives details on special burner design and units' ability to be changed from oil to gas firing in minutes. Orr & Sembower, Inc.
See ad on page 121.

327 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.
See ad on page 49 for information on self-contained boilers.

VIBRATION, SOUND CONTROL

328 Engineered Vibration Control—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co., Inc.
See ad on page 165.





for controlling lead oxide dust and fumes

In three great plants of the Willard Storage Battery Company, Dustube Collectors are collecting lead oxide dust and fumes created by plate cutting machines, dross hoods over refining kettles and scrap conveyors used in manufacturing storage batteries.

As in plants that set the pace in every industry, the Dustubes were selected by Willard engineers for their many cost-saving features plus their high collecting efficiency. As Mr. R. J. Halsall, Works Manager of the Memphis plant writes, "The control of lead dust at its source is of prime importance in our plant, and in planning for its effective control, Willard engineers, with years of experience in this field, specified our present equipment to handle the job."

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HIGH EFFICIENCY—Nearly 100% efficient by convincing tests.
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FASTER FILTER REPLACEMENT—Takes only a few seconds. Requires no tools.

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On the job, you enjoy increased pay; fine, modern working conditions; association with top men in your profession—men who have helped build Lockheed's reputation for leadership.

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Dear Sir: Please send me your brochure describing life and work at Lockheed.

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329 Sound Facts—This little folder gives the ABC's of noise. Tells what it is, how it is measured, and how company's sound control installations work to reduce noise levels to comfort range. Illustrates and describes briefly: machinery enclosures; sound barriers, traps; sound proof rooms. Industrial Sound Control, Inc. *See ad on page 48.*

HEATERS, HEATING

330 Propeller Fan Unit Heaters—Twelve-pp Bulletin 1301 shows how unit heaters can solve many a space heating problem. Both horizontal discharge and vertical discharge units are covered, and outstanding construction features detailed. Suggestions on where to place heaters provided, also basic steam and hot water capacity data, conversion factors. C. A. Dunham Co. *See ad on page 157.*

331 Heat Transfer Equipment—An excellent source of information on shell and tube heat transfer equipment, 28-pp Catalog DM-1150 covers heat exchangers, tank suction heaters, oil preheaters, condensers, evaporators, after-coolers, gas coolers, centrifugal pumps and water heaters. Instructions for installation, operation and maintenance are included. Bell & Gossett Co. *See ad on page 129.*

OTHER EQUIPMENT

332 Good Place for Wraps — Manufacturer's Lockerettes, modern scientific locker units combining best features of both lockers and coat racks, are described and pictured in Bulletin 658. Vogel-Peterson Co *See ad on page 160.*

333 Steam Condensers—Bulletin 102, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc. *See ad on page 161 for information on protection for heat exchanger tubes.*

334 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co. *See ad on page 147.*

335 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as handy guide to the selection of magnets. Dings Magnetic Separator Co. *See ad on page 14.*

336 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc. *See ad on page 156 for information on faucet washers.*

337 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp. *See ad on page 148 for information on flexible valves.*

338 Axial Flow Blowers—In this 6-pp illustrated bulletin are described axial flow blowers of both turbine-driven and motor-driven types. Gives capacity and dimensional data, operating range and specifications on both types. L. J. Wing Mfg. Co. *See ad on page 173.*

Three no-postage cards make it easy for you to order any of this literature. See pages 35-36 and 141-142.

RESEAT VALVES AND BIBBS
IN PLACE
QUICKLY
ACCURATELY
RESEATING A BIBB
RESEATING A VALVE
PAYS FOR ITSELF ON FIRST 2 OR 3 JOBS!
Don't junk expensive globe or angle valves, bibbs, fixtures—reseat them! Order Skinner Valve and Bibb Reseater. Easy to use. Guaranteed cutters leave seat glass-smooth, level, tight.
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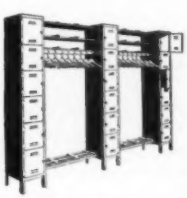
VALET RACKS

LOCKERETTE

—Combines the best features of both lockers and coat racks.



Wraps are exposed to air and light. Employees do not face the weather in damp wraps that have been crumpled in dark lockers — do not eat soggy lunches, soaked by wet hats or gloves. Each person has his own spaced coat hanger, ventilated hat shelf and 12" x 12" x 15" deep lock box for lunches, tools and personal effects.

Lockerettes save space too . . . the No. 6-12 (2-column) accommodates 12 people in 6 ft; the No. 9-18 (illustrated) accommodates 18 in 9 feet.

Write for Bulletin No. OL-14

"... an expression of faith in the intrinsic soundness of our country."

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President, Addressograph-Multigraph Corporation

"The purchase of United States Savings Bonds is an expression of faith in the intrinsic soundness of our country, and indicates foresightedness with respect to one's own future needs. Since the inception of the Payroll Savings Plan by Addressograph-Multigraph Corporation in 1942, a large percentage of employees have continuously availed themselves of this safe and convenient method of providing for later benefits."

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Payroll savers are serious savers. Since May, 1951, through April, 1952, E Bonds maturing totaled $2,345,000,000. But, only $593,000,000 of these matured bonds have been presented for payment. 75% of these matured bonds are still held by their purchasers.

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MATERIALS HANDLING ENGINEERS
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BULLETINS

(Continued from page 36)

and with 6 to 18 wheels to the foot. Book discusses stronger construction, other features of the line; is illustrated to show standard and special applications of the units. Harry J. Ferguson Co.

147 Hinged-Steel Conveyor Belt—Illustrated Catalog MF-530, 4 pp, decribes and presents specifications on company's recently developed hinged-steel belt, designed to withstand extreme wear and handle metal scrap, hot forgings, flash, wet or dry metal chips, other sharp or abrasive materials. May-Fran Engineering Co.

148 Casters and Trucks—Catalog CT-52 is a newly revised 36-pp ordering guide. Provides photos and specifications on casters and wheels for light, medium, or heavy loads on all types of floor surfaces. Shown for the first time are company's new 43 Series casters combining low cost with durability for medium duty industrial use. A large selection of wheels to fit individual handling problems is offered, including capacities to 3500 lb. Practical tips on selection and application included. The Rapids-Standard Co., Inc.

149 Chain Hoists—Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists, ball bearing and I-beam trolleys are described separately, along with construction features and sizes. Reading Crane & Hoist Corp.

150 Four-Rope Buckets — For those whose plants are equipped with overhead or bridge type cranes with 4-rope bucket trolleys, 44-pp Bulletin 2392 offers excellent reference information. Features a list of factors vital in purchase of a 4-rope bucket and provides performance data and comparisons of cargo dispatch and discharging vessels, barges and railroad cars. Presents information on 4-rope bucket types, reeving, arrangement of cables. Blaw-Knox Div., Blaw-Knox Co.

151 For Overhead Handling—The Loadmaster, an overhead crane designed for economy, faster moving and safer handling is the subject of this illustrated folder. Special construction features are described, pictured. Folder also explains how this crane can cut handling costs. Bedford Foundry & Machine Co., Inc.

152 Hand Trucks for Tough Jobs—Specifications for several general and heavy-duty industrial hand trucks are given in Form 815, a small folder. Stresses correct balance, easy handling; pictures trucks in use. Standard Pressed Steel Co.

See pages 35-36 and 141-142 for postage-free mailing cards. Use them to ask for bulletins—just list the item numbers of all those wanted.

153 Power Wheelbarrow with Plus Features—Low cost materials handling with company's Moto-Bugs is shown in this bulletin. Some 25 action photos demonstrate the unit's work in construction and maintenance jobs with various types of bodies and attachments. Kwik-Mix Co.

154 Job-Engineered Hand Trucks — Twelve-pp Form 508-B, a condensed catalog, gives specifications and illustrations of a complete line of two- and four-wheel hand trucks, trailer trucks, platform skids, dollies, lift jack systems, wheels and casters. The Howe Scale Co.

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SLY Dust Collector on roof at Pinkerton Tobacco Co. plant. Tobacco cleaning machines with dust pipes to Collector.

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SLY CAN CORRECT IT

Tobacco dust is only one of the *difficult* dusts being collected by Sly Dust Filters. Others are powdered sugar, bentonite clay, paint and pigments, aspirin and other pharmaceuticals, chemicals of all kinds, talc, lime, detergents. Designed and engineered so that they save on space and power, Sly Dust Filters require less attention, less maintenance, yet — they are not expensive.

Sly Dust Filters are used to collect more than 100 kinds of dusts — and they get *all* the dust by filtration through cloth. Ask for Bulletin 98 and tell us your dust problem. Our experience with thousands of installations is at your disposal.

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155 Truck Attachments—Here's a 28-pp catalog featuring attachments, tools and accessories designed to lower cost and increase the ease of handling materials with company's industrial trucks. Includes model views, diagrams, specifications, action pictures, explanatory text. Hyster Co.

MECHANICAL POWER TRANSMISSION

156 Oilless Bearings for Conveyors—Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides tabular data and dimensional drawings to facilitate identification of bearings for replacement. Engineering information covers design and operating data, standard tolerances, clearances, press fits and speeds and loads. Arguto Oilless Bearing Co.

157 Hints on Babbitting Practice — In outlining basic steps for the prevention of common bearing failures, Bulletin 146, a little 16-pp booklet, covers everything from the choice of metal for a particular bearing application through the correct pouring practice to in-service maintenance. Proper lubrication, a maintenance schedule, and operation at correct speed and load are discussed. Federated Metals Div., American Smelting and Refining Co.

158 New Gearmotors — A new line of gearmotors, comprising motor and speed reducer compactly mounted in a single housing, and offering speed ratios from 2.5:1 to 97:1 is described in 8-pp Bulletin B-601. Open-dripproof, totally enclosed non-ventilated and fan-cooled frame constructions are covered. Star-Kimble Motor Div., Miehle Printing Press & Mfg. Co.

WATER TREATMENT

160 New Data on Zeolite Softeners — Publication 4520-A is a recently revised edition of company's booklet on zeolite water softening. Provides a glossary of terms used in the process, data for laying out a zeolite softening plant, factors governing size of equipment, selection of zeolite materials and discussion of the four stages of operation of a sodium zeolite softener. Cochrane Corp.

161 Data on Cation Exchange Resin — Now available are 9 pp of technical information on Amberlite IR-112, a medium capacity cation exchange resin possessing desirable physical and chemical properties of the polystyrene nuclear sulfonic acid type materials. Discusses low cost, other advantages of the resin; tells applications. Physical, chemical, hydraulic and operating characteristics are detailed. The Resinous Products Div., Rohm & Haas Co.

TOOLS, WELDING

162 Tractor Service Tool Manual — Twelve-pp Bulletin HC-52 gives complete information on company's tools designed for servicing International tractors. Both manual and hydraulically operated pulling tools are shown with attachments and accessories for use with the Power Twin hydraulic puller. Owatonna Tool Co.

163 Vises for All Jobs — Catalog 60, 24 pp, said to be the largest vise catalog published, illustrates a wide range of industrial, woodworking and other types. Fast-reading text and clear pictures show features and applications and facilitate ordering through quick identification. Catalog is indexed, punched for filing. The Desmond-Stephan Mfg. Co.

165 How to Weld Mild Steels—This new 28-pp manual, "The Welding of Mild Steels," gives procedure for welding mild and alloy steels and information about electrodes available. Specifications, operating characteristics, mechanical properties, uses and other data on company's metals are briefly presented. "Quick selec-

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Typical of the many successful Palmetto case histories is the notable performance of Palmetto 1000 at the Pine Grove station of Pennsylvania Power and Light Co. Application is in an extensively used centrifugal pump handling boiler feed water maintained at 325 F while operating at 1750 rpm under 460 psi. Throughout extremely long periods, this popular, square braided packing remains soft and pliable — serving and saving. The success secrets of Palmetto 1000 are — a unique lubricant compound designed to the service . . . exclusive method of lubricating each individual strand . . . braid over braid construction to seal in the reservoir of lubricant . . . finest materials. Only Palmetto Self-Lubricating Packings are manufactured in this manner to assure friction-free performance. Write for complete catalog PC-101.

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• To obtain maximum operating efficiency in your pressure regulator installation it is essential that 1) the regulator be the correct size; 2) that it has the proper operating characteristic for the job. The Davis line is complete; no matter how special the application, Davis builds a regulator that will do the job.

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tion" charts make it easy to find right electrode for every fabrication and maintenance welding need. The McKay Co.

166 **Welding Accessories, Safety Aids** — Illustrated Catalog 24, 44 pp, gives application and ordering information on welding helmets, hand shields, electrode holders, cleaning hammers, weld testing machine and welding cable, as well as protective clothing. Also includes list of practical safety suggestions for the welder and his helper. The Fibre-Metal Products Co.

SANITATION

167 **Adequate Washing Facilities**—Stressing value of selecting washroom facilities according to plant need, this single-sheet bulletin shows some modern equipment and diagrams some suggested washroom layouts. Bradley Washfountain Co.

168 **Creams for Working Hands**—Following a discussion on prevention of industrial dermatitis, this 12-pp booklet discusses properties and use of three protective creams and a liquid hand cleaner. The creams include an oil resistant type, a water resistant type and a work cream for application after exposure to degreasing materials. John H. Breck Inc.

LUBRICANTS, LUBRICATION

169 **For Centralized Lubrication** — Featuring selection charts covering low and high pressure fluid lubrication systems for a wide range of industries and providing an explanation of operating principles of various types of systems, 24-pp Catalog 80 covers company's lubricant application equipment. Describes and pictures lubricant pumps, transfer and dispensing equipment, accessories. Specifications included. Lincoln Engineering Co.

170 **Die Casting Lubricants** — Four lubricants developed to provide clean, accurate castings, longer die life and more economical production are described in this folder. Offers such practical information as recommended proper dilutions and application of these heat-resisting lubricants for various zinc and aluminum die casting operations. E. F. Houghton & Co.

171 **Industrial Lubricant** — Technical Data Sheet VSA-1 gives 4 pp of information on Valve Seal A, a non-melting silicone lubricant, which besides its stability at extreme temperatures, is resistant to oxygen and many chemicals and gases. Discusses properties of the lubricant, tells best applications. A considerable body of information on chemical resistance of Valve Seal A is given in the form of tables classified according to inorganic, organic and mixed chemical service and gas service. Dow Corning Corp.

METALS

172 **Aluminum Alloys**—This 22-pp booklet covers composition, typical mechanical properties, heat treatments and basic foundry applications of standard aluminum alloys produced by manufacturer. Each alloy is cross referenced to ASTM, SAE and Alcoa designations of alloys with similar composition and mechanical properties. Apex Smelting Co.

173 **Metal Cleaning Hints** — This summarized 6-pp bulletin on metal cleaning includes concentrations for various cleaning applications and a handy streamlined list of cleaners for general industrial use. Briefly decribes recommended uses of each of company's alkaline, emulsion, acid phosphate and surface active agent types of cleaners. E. F. Houghton & Co.

TRAPS, FILTERS

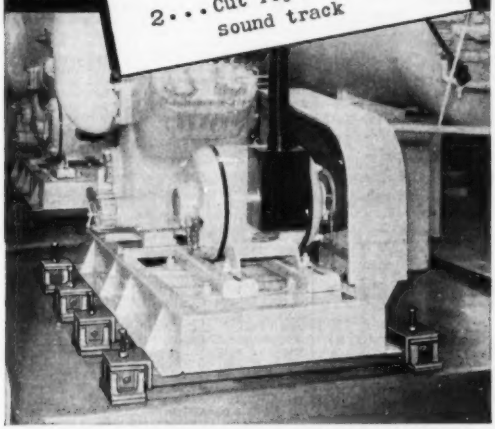
174 **Air Trap Selection** — Convenient guide to selection and installation of air traps for automatic drainage of water from compressed air intercoolers, aftercoolers,

Here's How

PATHÉ

1...Salvaged expensive "lost" office space

2...Cut rejects on film sound track



These two compressors, installed in a machinery penthouse on the 11th floor of the Pathé Television Center, New York, are now mounted on Korfund standard steel spring vibre-isolators. The structural steel saddles shown are not ordinarily required, but were used in this case so that original piping could remain unchanged.

...by controlling vibration

When originally installed, each of these two big compressors was mounted on 4 rubber-in-shear rails, which were not the proper isolation for the vibration frequency and floor conditions.

Consequently, vibration transmission through these "mountings" was so bad that it was impossible to use office space on the floor below, and vibration and noise transmitted through the building were picked up on film sound tracks several floors down.

Now, remounted on Engineered Korfund Spring Isolators, the job is entirely satisfactory and has been in operation for the last three years.

Korfund Engineered Vibration Control would have cost no more in the beginning.

A selector chart in Bulletin G-104 gives basic isolation recommendations for both normal and critical operating conditions for pumps, fans, compressors, refrigerating and other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

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Unsolicited testimonial letters from experienced maintenance men state specifically that VALDURA M & F Heavy Duty Enamel is by actual comparison the most economical enamel they have ever used. That's because M & F is made especially for heavy duty maintenance work . . . made to spread farther . . . made to stand up under actual abuse. It's marvelous for machinery . . . a long time favorite for hard working floors . . . and it's wonderful for walls and woodwork. Certified copies of authentic testimonial letters are yours for the asking. If you'd like to try M & F before you buy—

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Just fill out and clip this coupon to your business letterhead and mail to the address shown below.

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Please send color card and liberal sample of M & F Enamel.

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TITLE _____

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Tough Job!

■ This conveyor system carries heavy rolls of paper from freight cars to presses at a large printing plant. Rolls weigh as much as 3500 lbs., averaging 1500 lbs. Imperial's *Black Rexall Belt* was selected for this job because of its great strength and toughness. The original belt, installed over two years ago, is still in excellent condition. User reports service "very satisfactory."

Constructed of tight-woven 37½-ounce silver duck, Black Rexall Belting is double-stitched and inner-locked to prevent ply separation. It is impregnated with a specialized compound that strengthens, lubricates and preserves the duck fibres. Unexcelled for conveyors and elevators handling heavy or semi-abrasive materials. Write for Data Sheet BR-1.

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Better PIPE TOOLS

PIPE CUTTERS

"ARMSTRONG BROS." Three wheel and Standard wheel and roller Pipe Cutters are quality cutters throughout . . . built to give years of good service.

"ARMSTRONG BROS." drop forged Pipe Cutters are built for lifetime service with 1-piece drop forged steel heat treated body and a replaceable hardened steel nut to take up the wear and thrust of handle screw. Used either as 1-wheel (with 2 roller) or 3-wheel (for close quarters).

"ARMSTRONG BROS." Knife Blade Cutter Wheels are machined from special alloy tool steel properly heat treated. They cut rapidly and easily, hold their keen edge.

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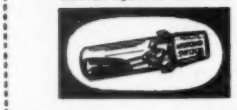

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Complete Mercoid Catalog sent upon request

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receivers, separators and drip points. Bulletin 2021 includes physical data and list prices for both ball float and inverted bucket traps. Photos and drawings show installations. Armstrong Machine Works.

176 Ventilation-Air Conditioning Filters —Illustrated Bulletin 100, 8 pp, describes company's Staynew filters for ventilation and air conditioning applications. Contains specifications, engineering and performance data covering various types of filters recommended for removal of dust, other materials by impingement. Dollinger Corp.

OTHER EQUIPMENT

178 Progressive Mechanizations in Action —Sixteen-pp Booklet GEA-5789 sets forth a program to help plant engineers step up the mechanization of operations for greater productivity, better products, lower unit cost. Discusses and illustrates this program through stages of hand operation, simple mechanization and improved mechanization to automatic control and continuous process stages, telling which operations would be benefited by the use of machines, greater power, higher speeds. General Electric Co.

179 Improved Tracing Cloth — Booklet A-2029, a 4-pp folder, describes Brutex, a white, moisture resistant pencil tracing cloth designed for clearness, better drawing surface and greater durability. Discusses features. Charles Bruning Co., Inc.

180 Compressor-of-All-Work — The Pneumatractor, a self-propelled air compressor that will push, pull or power like a tractor—besides providing air for any pneumatic tool operable from a 105 cu ft air compressor — is described in 12-pp Catalog 5140. Shows how operator can change from compressor to tractor or back; or operate as both at the same time. Describes pneumatic tool attachments for use with versatile Pneumatractor, pictures some of the jobs handled. Construction features and auxiliary equipment are illustrated. Schramm Inc.

181 Thrifty Isolation Padding—Bulletin ER-702 describes Elasto-Rib, an efficient, low-cost isolation pad material designed to control transmission of vibration and noise without bolting to the floor for most machinery and equipment applications. Gives loading limits, shows typical installations. The Korfund Co.

182 To Simplify those Records—Changing and maintaining reference indexes and records can often be a time consuming job, but Folder RD 608, 12 pp, describes Index Visible equipment which can be used to make easier work of maintaining such records. Index Visible consists of die cut cards which button into runways so as to bring their indexing edges to a fixed position with uniform visibility. Remington Rand Inc.

184 Industrial Hose Assemblies — Crammed with dimensions, uses and prices for all types of rubber hose assemblies, 8-pp Catalog 3 gives specific data for rubber tube and couplings for vari-purpose, paint and solvent spray, hydraulic and lubrication assemblies. Both medium and high pressure hose specifications are given. Carlyle Rubber Co., Inc.

185 Oil Hydraulic Equipment—Providing photos and layout drawings of typical hydraulic designs, this new 20-pp catalog covers hydraulic pumps, pressure controls, four-way valves, check valves, special valves and cylinders, positive remote control, power units and test stands. Operational and design details of all units discussed. Superdraulic Corp.

186 O-Ring Engineering Handbook — Extensive and helpful information on selection and use of O-rings is provided in this 48-pp book. Tells how to choose O-rings and order them, defines terminology and includes excellent general O-ring gland design information on installations for pressures to 500 psi, for pressures not over 1500 psi and for those in excess of 1500 psi. Plastic and Rubber Products Co.

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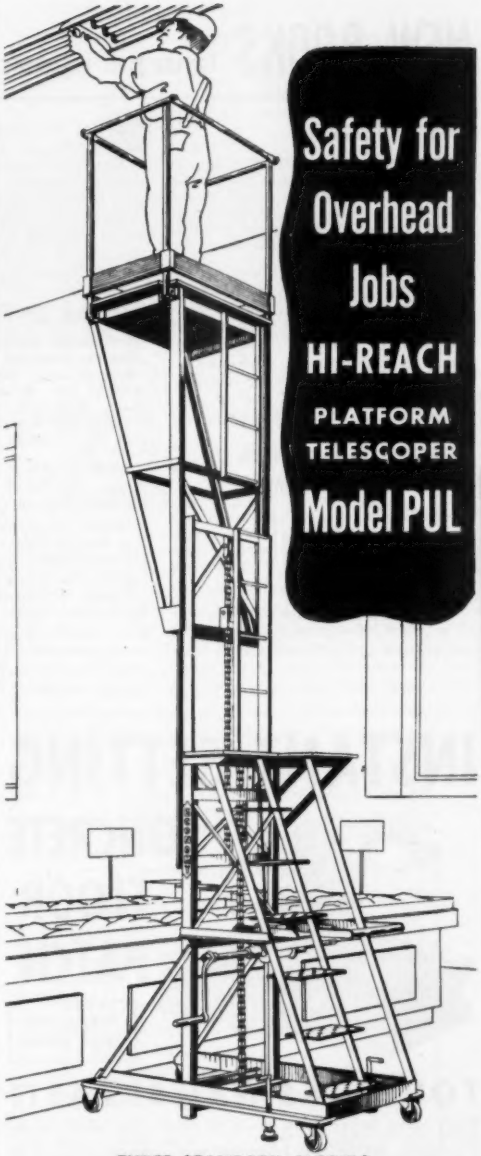

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SIMPLIFIED PRACTICE RECOMMENDATION 247-52. Size 5⅞ by 9⅛ in.; 308 pp; illustrated; paper bound. Published by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 75c.

THIS BOOK goes into different details of preparing steel products for domestic shipment. It covers various ways of identification, methods of car loading, protection against the elements and damage, and weighing. The large number of illustrations which are of good quality offer information on steel shipments.

Manganese by Electrolysis Its Part in Useful Alloys

Electrolytic Manganese and Its Alloys by Reginald S. Dean. Size 5¾ by 9 in.; 257 pp; cloth bound. Published by Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Price $12.00.

THIS BOOK covers the development of a practical method of producing manganese by electrolysis. It goes into the essential steps of the electrolytic process and discusses several types of furnaces that can be used for manganese ore reduction.

Extensive attention is given to various properties of ferrous and non-ferrous alloys of electrolytic manganese. This is substantiated by a number of charts and tables. Many references to technical and patent literature are cited.

Brickwork and Floors

NATIONAL BUILDING STUDIES. Booklets published by H. M. Stationery Office, London, Eng.; available from British Inf. Service, 30 Rockefeller Plaza, New York 20, N. Y. Price for Bulletin No. 9 about 35c ppd., for Report No. 11 about 40c ppd.

SOME COMMON DEFECTS IN BRICKWORK, Bul. No. 9. This 22 page, well illustrated publication covers many common masonry conditions. It offers descriptions of various troubles encountered, followed by diagnoses, causes, remedies and preventions.

FLOOR FINISHES FOR INDUSTRIAL BUILDINGS, Special Report No. 11. This handy 28 page pamphlet presents practical information on industrial floors in a clear and relatively simple language. The available types of floors are covered along with points to consider in the selection of flooring material. Also included is a discussion on repairs.

One double page table covers the different properties of floor finishes and another similar size table is devoted to bedding and joining materials used in flooring work.

More Light on Lighting

I.E.S. Lighting Handbook, Second edition; size 6 by 9 in.; 987 pp; illustrated; cloth bound. Published by the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y. Price $8.00.

PACKED with facts and figures, this handy book brings before the reader a solid coverage of the subject of lighting. Starting with basic physics, the book goes into color, control, light sources, calculations, lighting for different purposes and miscellaneous applications of radiant energy.

The section in the back carries extensive manufacturer's reference data which have been checked to comply with I.E.S. specifications.

The current edition has more pages than the 1947 edition by 15 per cent. A great deal of effort was put into revision work which produced a 75 per cent change in the subject matter.

Here are a few of the many sub-

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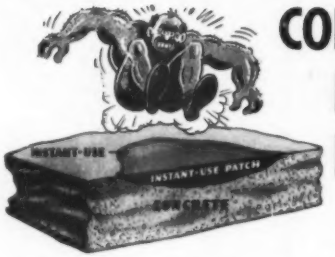

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jects appearing in this handbook: natural phenomena; steps in working out a lighting design; electrical measurement of fluorescent lamp circuits; color harmony; refraction; group replacement; and office lighting.

Study of Electrical Measurements

ELECTRICAL MEASUREMENTS by Forest K. Harris. Size 6½ by 9¼ in.; 784 pp; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N.Y. Price $8.00.

IN THIS BOOK, Dr. Harris discusses the origins, relations and dimensions of electrical units; he then systematically presents basic instrument theory, starting with the study of the galvanometer. This study includes material which has never appeared in print before. Each subject is examined in such a way as to give the reader a good working knowledge of the methods and apparatus used in measurements.

In short, this book offers a thorough well balanced authoritative treatment which clearly shows how best to obtain the required degree of accuracy or repeatability in the job at hand.

Dr. Harris points out, a certain degree of sophistication on the part of the reader must be assumed; therefore, it is supposed that the reader has a background of mathematics through calculus and that he has sufficient laboratory experience to know something about the manipulation of electrical instruments and apparatus.

Electrical Code Handbook

NATIONAL ELECTRICAL CODE HANDBOOK by Arthur L. Abbott. 7th edition; size 5 by 7⅞ in.; 652 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price $6.00.

THIS IS a useful book for plant electrical work. It brings assurance that a job is not just being done but that it is carried out according to code requirements. Plant changes often require electrical changes. Questions may arise as to wire sizes, protective devices, conduit limitations and so forth. This revised edition based on the 1951 national electrical code can answer many queries of that nature.

There are six main sections in this handbook, namely definitions, approved types of wiring, installation of materials and apparatus, general requirements for wiring installations, special installations and equipment, and construction of materials. This includes a chapter containing 34 reference tables.

The same key to code requirements appears in the front as well as in the back of the book. Thus, material is at hand whether one opens front or back cover.

Power Costs on Generating Plants

REPORT ON OIL AND GAS ENGINE POWER COSTS FOR 1950. 44 pp; illustrated; size 8½ by 11 in.; paper bound. Published by American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y. Price $2.50.

TWELFTH REPORT of a series, the ASME Subcommittee on Oil and Gas Engine Power Costs analyzes 146 oil and gas engine generating plants, containing 536 engines, totaling 560,132 rated bhp, and with a net output of 899,044,521 kwhr.

Fact-finding only, the report does not attempt interpretation. Instead, information is presented with the use of charts and extensive tables on performance and production costs.

For the first time fuel economies of engines and plants are reported on the basis of Btu per gross kwhr. Formulas defining other costs, outputs and economies are similar to those used in previous reports.

Theory and Principles of Electricity

ELECTRICAL ENGINEERING by Clarence V. Christie. Sixth Edition; 670 pp; 6½ by 9¼ in.; cloth bound; illustrated. Published by McGraw-Hill Book Co., 330 W. 42nd St, New York, N. Y.; 1952. Price $7.00.

THIS BOOK on the theory and characteristics of electrical circuits and machinery presents the subject from the standpoint of the fundamental principles of electrostatic and electromagnetics. It is intended as a foundation for lecture courses for junior and senior students in Electrical Engineering. Written primarily for students in the low frequency power and industrial electrical fields it nonetheless presents an adequate basis for those particularly interested in the fields of electronic control and communication engineering.

Tips on Patents and Copyrights

Copyright, Design and Patent Guide by Henry J. E. Metzler. Size 5½ by 8½ in.; 125 pp; illustrated; paper bound. Published by Ameliorant Co., Inc., P. O Box 108, Halesie, L. I., N. Y. Price $2.00.

HERE'S A BOOK that can be of help in clearing up important points on patent and copyright laws. Clearly written, the text is such that it offers information to men in many lines of endeavor. It is not strictly aimed at the members of the legal profession.

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V-Belts are Versatile

(Continued from page 71)

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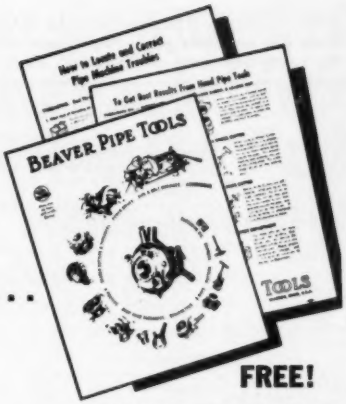

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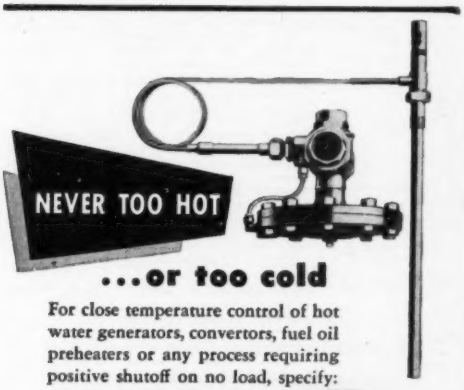

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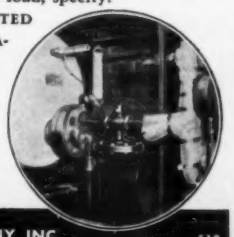

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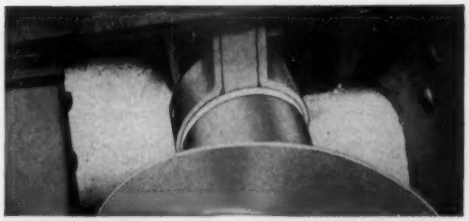

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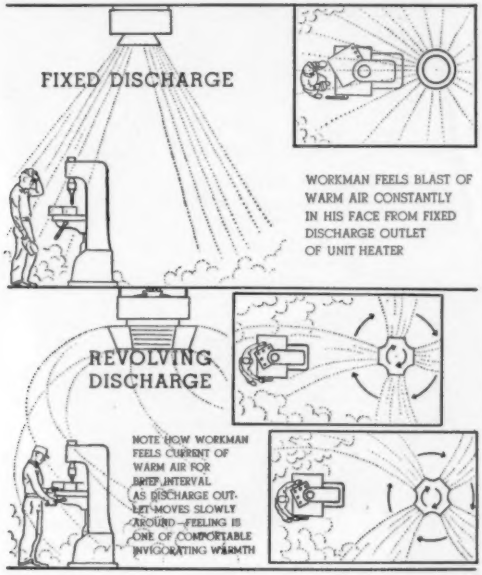
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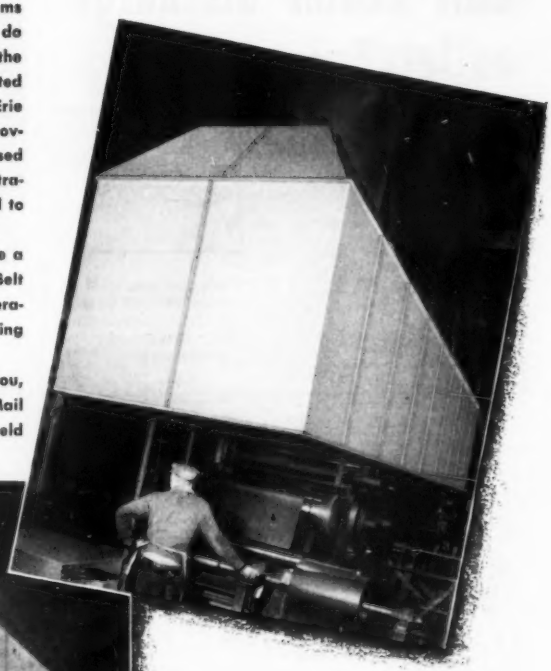

***Above and to the Left:** Two views of the saturators which apply coating to roofing materials. Two Hartzell belt drive duct fans are in use in each illustration.*

The Hartzell field office which handled this job is located at 23 Maple Ave., North Girard, Pa.—Telephone 317.

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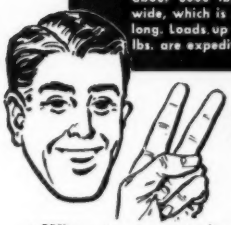
A great deal of time is saved when placing lumber into the balcony storage. Here is shown a 5000-lb. load of 8" x 12'-0" planks hoisted onto a portable platform which extends from one balcony to the other. Once on the platform the load is easily pushed to either side by means of rollers.



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The same Tramrail equipment saves much time in handling lumber to the mezzanine storage. Formerly boards were placed there one by one. Now large loads are lifted onto a platform and then rolled to one side or the other where men can quickly handle them into the proper storage sections. The platform is portable and moved about with the Tramrail carrier.

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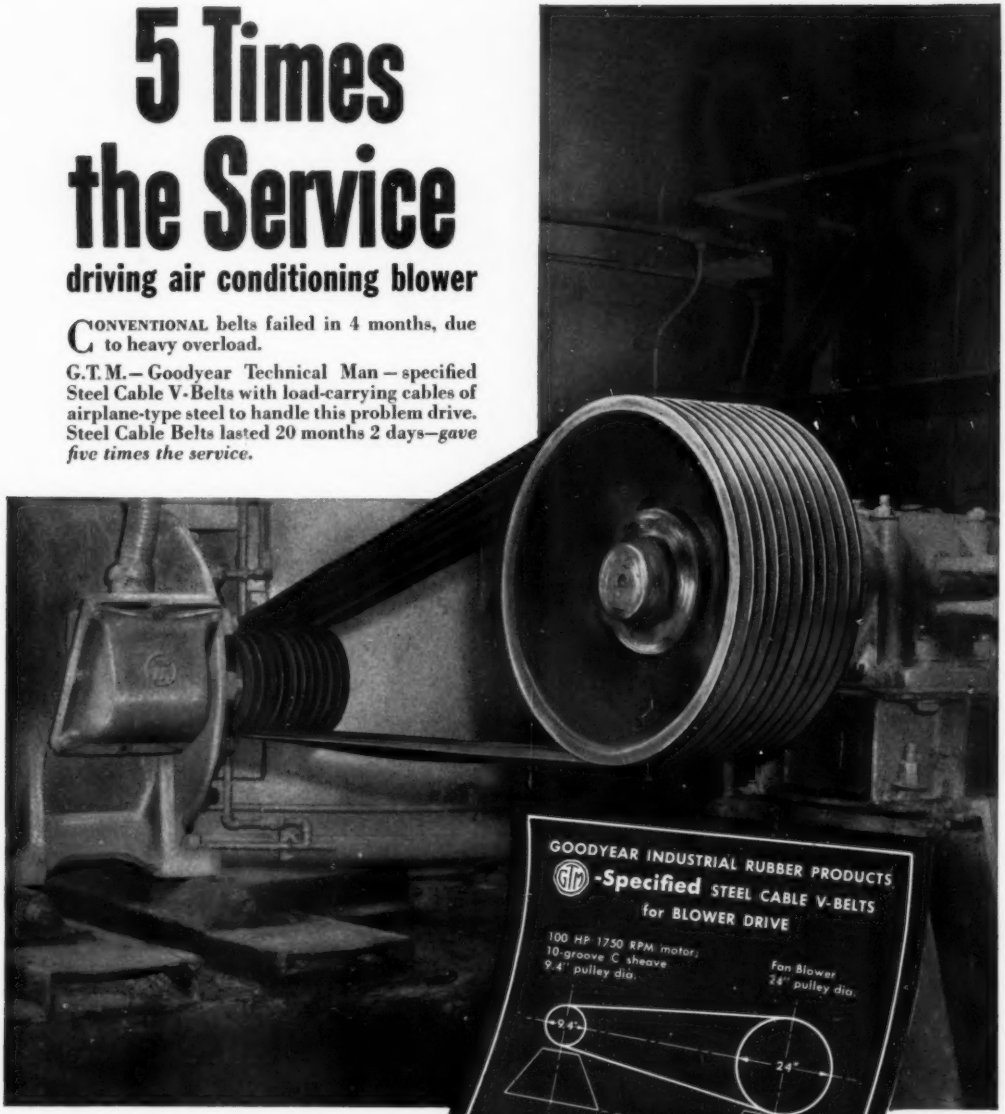

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